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MINERALS YEARBOOK

Volume III

AREA REPORTS: INTERNATIONAL 1995

MINERAL INDUSTRIES OF EUROPE AND CENTRAL EURASIA

UNITED STATES DEPARTMENT OF THE INTERIOR

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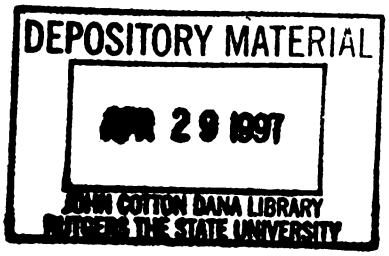

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UNITED STATES DEPARTMENT OF THE INTERIOR • Bruce Babbitt, Secretary

GEOLOGICAL SURVEY

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering sound use of our land and water resources; protecting our fish, wildlife, and biological diversity; preserving the environmental and cultural values of our national parks and historical places; and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interests of all our people by encouraging care. The Department also has a major responsibility for Native American reservation commnnities and for people who live in Island Territories under U.S. administration.

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Foreword

This edition of the U.S. Geological Survey (USGS) Minerals Yearbook discusses the performance of the worldwide minerals and materials industry during 1995, and it provides background information to assist in interpreting that performance. Content of the individual Minerals Yearbook volumes follows:

Volume I, Metals and Minerals, contains chapters about virtually all metallic and industrial mineral commodities important to the U.S. economy. Chapters on survey methods, summary statistics for domestic nonfuel minerals, and trends in mining and quarrying in the metals and industrial minerals industries in the United States are also included.

Volume II, Area Reports: Domestic, contains a chapter on the minerals industry of each of the 50 States and Puerto Rico and the Administered Islands. This volume also has a chapter on survey methods and summary statistics for domestic nonfuel minerals.

Volume III, Area Reports: International, is published in four separate reports. These reports collectively contain the latest available mineral data on more than 190 foreign countries and discuss the importance of minerals to the economies of these nations and the United States. Each report begins with an overview of the region's mineral industries during the year. It continues with individual country chapters that examine the mining, refining, processing, and utilization of minerals in each country of the region and how they relate to U.S. industry. Most chapters include production and industry structure tables, information about Government policies and programs affecting the country's minerals industry, and an outlook section.

The USGS continually strives to improve the value of its publications to users. Constructive comments and suggestions by readers of the Minerals Yearbook are welcomed.

Gordon P. Eaton
Director

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Contacts

Information about the U.S. Geological Survey, its programs, staff, and products may be accessed by the Internet at http://www.usgs.gov/. Geologic information on topics such as earthquakes, volcanoes, energy, and mineral resources is available by contacting the Geologic Inquiries Group at (703) 648-4383. Map, digital data, and aerial photography products and information are available by contacting the Earth Science Information Center at 1-800-USA-MAPS. Water data and information may be obtained by contacting the Water Information Center at 1-800-426-9000. For specific information about this publication, contact the Chief, International Minerals Section, Minerals Information Team, at (703) 648-7732 or e-mail at eshekar@usgs.gov or the Chief, Publication Services Section, Minerals Information Team (703) 648-4750 or e-mail at kharris@usgs.gov. General information about the Minerals Information Team may be accessed by the Internet at http://minerals.er.usgs.gov/minerals/.

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Acknowledgments

The Country Specialists in the Minerals Information Team, U.S. Geological Survey, in preparing the International Review regional books of Volume III of the Minerals Yearbook, extensively utilized statistics and data on mineral production, consumption, and trade provided by various foreign government minerals and statistical agencies through various official publications. The cooperation and assistance of these organizations is gratefully acknowledged. Statistical and informational material was also obtained from reports of the U.S. Department of State, from United Nations publications, and from the domestic and foreign technical and trade press. Of particular assistance were the routine and special reports submitted by the 10 Regional Resource Officers assigned to minerals and petroleum reporting and by economic and commercial officers and other officials of the Department of State in U.S. Embassies worldwide. Their contributions are sincerely appreciated. Internal statistical support was provided by the staff of the Data Collection and Coordination Section.

The regimes of some countries reviewed in this volume may not be recognized by the U.S. Government. The information contained herein is technical and statistical in nature and is not to be construed as conflicting with or being contradictory of U.S. foreign policy.

John H. DeYoung, Jr.
Acting Chief Scientist, Minerals Information Team

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THE MINERAL INDUSTRIES OF EUROPE AND CENTRAL EURASIA

By Richard M. Levine, Harold R. Newman, and Walter G. Steblez

From 1990 to 1995, the area referred to as Europe and Central Eurasia displayed unprecedented social, political, and economic dynamism. The formerly centrally planned economy countries of Eastern Europe and the former Soviet Union (FSU) began the process of transition to market economy systems, and the countries of Western Europe accelerated their effort to integrate their economies into a single federated organization. However, by yearend 1995, the economies of Western Europe, on the one hand, and those of Eastern Europe and Central Eurasia, on the other, remained asymmetrical, requiring further economic development among countries in the later group. The interaction of Western Europe with the formerly centrally planned economy countries in the minerals sector was based on this asymmetry. Western Europe imported mineral commodities from, toll smelted raw materials in, sold equipment and technology to, and invested in mineral enterprises and mineral development projects in the formerly centrally planned economy countries of Eastern Europe and the FSU, largely without any reciprocal activities on the part of the formerly centrally planned economy countries.

Western Europe.—The European Union (EU) increased from 12 to 15 in number on January 1, 1995, when Austria, Finland, and Sweden formally became members. This entry undoubtedly marked the end of an era when Western Europe was divided into two groups of countries: those which belonged to a simple free trade area in the shape of the European Free Trade Association on one hand and members of the European Community in favor of more intensive integration on the other.

In June 1995, three Baltic nations, Latvia, Lithuania, and Estonia, signed Association Agreements with the EU that formally puts them on the track for eventual EU accession. Also, Slovenia and the EU initialed an Association Agreement that is awaiting final signature. With the exception of Liechtenstein, Iceland, Norway, and Switzerland, every country in Western Europe has chosen to join the EU. The six Central and Eastern European countries Bulgaria, Czech Republic, Hungary, Poland, Romania, and Slovakia, have expressed interest in joining the EU around the turn of the century.

After a period of low growth and recession in most areas, Western Europe's economic development was moving ahead. There was a rapid increase in investment flows in 1995. The economic growth in major EU countries resulted in increased consumption of minerals, allowing prices to rise to profitable levels for producers of some commodities.

Efforts by various EU nations toward privatization of nationalized mining companies and state-owned mineral enterprises, liberalization of investment laws allowing foreign ownership of mining companies, and the repatriation of profits were continuing. Government support for high-cost production was withdrawn or significantly reduced.

The EU is a leading world industrial and trading power. It has a population of 370 million, and its 6 billion Ecu[1] gross national product is 10% higher than the United States and 64% higher than Japan. The EU is the world's leading exporter at $546 billion, excluding intra-Union trade. It accounts for almost 19% of world exports, ahead of the United States and Japan, both with 16%.

In addition to being a large metals producer and consumer, the EU trades heavily in nonferrous metals. In the case of mineral raw materials, the EU is a net importer. The EU is a net exporter of aluminum, copper, and lead semimanufactures.

EU production tends to be concentrated in refined metal with relatively low shares of mine output. Production of copper and copper alloy semimanufactures represent about 40% of world production.

Nonetheless, in the certain mining areas, EU nations are important producers of bauxite (Greece), copper and tin (Portugal), nickel (France and New Caledonia), lead (Ireland and Spain), and zinc (Ireland and Spain).

In Western Europe, emphasis continued on exploration for gold, bauxite, copper, lead, and zinc. New finds of gold mineralization on Sardinia Island, Italy, and in Scotland, United Kingdom, were encouraging. Exploration for lead and zinc in Ireland and Spain and for copper in France and Portugal also continued.

Various incentives, including tax relief, revised regulations, and less government involvement have been offered to encourage exploration by foreign countries. However, it has been reported that, of about $450 million spent on exploration by European-based companies, less than $40 million was invested within Europe itself.

Central Eurasia.—The territory of the FSU is comprised of 15 independent countries, each of which possesses its own particular situation regarding government, legal structure,

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financial institutions, and investment climate.

Each country is confronting different circumstances regarding its future mineral production and supply because of its resource endowments, geography, and political and economic structures.

Among the new countries of the FSU, Russia, Kazakstan, and Ukraine are major international producers for a wide range of minerals. Also of importance is Uzbekistan, one of the world's major gold producers. Azerbaijan and Turkmenistan are important mineral fuel producers; and Armenia, Belarus, Georgia, Kyrgyzstan, and Tajikistan produce or have reserves of one or more minerals of international significance. The three Baltic states (Estonia, Latvia, and Lithuania) and Moldova are not important mineral producers, but the Baltic states are important transshipment points for minerals. Despite the differences among these new countries, there are some broad trends that affected the region of the FSU in 1995.

In 1995, the mineral industries of some FSU countries, after 4 years of continuously decreasing output, began to revive. Since the breakup of the Soviet Union, there had been a severe decline in production for many mineral commodities with mineral industries often operating at far below capacity.

Along with decreasing production, there was a sharp fall in domestic mineral consumption within the FSU with metal-producing, fabricating, and manufacturing industries, particularly those involved in defense industries, producing less and hence consuming less metal. In Russia, for example, between 1990 and 1994, according to the Russian Committee for Metallurgy, aluminum consumption fell 3.1 times, copper 2.2 times, lead 2.5 times, magnesium 1.8 times, molybdenum 3.7 times, titanium 3.2 times, and zinc 2.8 times. The fall in consumption was generally greater for the other countries of the FSU.

The fall in domestic consumption was coupled with large exports for hard currency of a wide variety of minerals, both produced and stockpiled, with large impacts on world markets, particularly for aluminum, cobalt, ferroalloys, magnesium, nickel, potash, titanium, uranium, and zinc.

In 1995, the trend of increasing exports continued. There was an increase in exports from the FSU of practically all metals in terms of physical volume, total dollars earned, and dollar price per unit of commodity exported.

In 1995, in the FSU, there continued to be domestic shortages of minerals, particularly fuels, as the mineral consumers in the FSU were unable to pay for mineral inputs, and the mineral producers in these countries also preferred to export their mineral output for hard currency.

The fall of the Soviet Union left the newly independent states without domestic resources of some or most of the mineral raw materials on which they depended. For example, all titanium raw material came from Ukraine; almost all chromite from Kazakstan; all manganese from Ukraine, Georgia, and Kazakstan; all antimony metal from Kyrgyzstan; and so on. A number of new programs are underway in FSU states to develop full-cycle mining and processing facilities to supply their own mineral commodities rather than to continue with former supply and production linkages with each other.

It is far from clear that these programs are based on comparative advantage or the desire to produce value-added mineral products rather than the desire not to be dependent on foreign sources for mineral raw materials, processing facilities, and products. However, the striving to lessen dependence on FSU states is based not only on old autarkic thinking, but also on realistic concerns about the ability of these new independent countries to be reliable suppliers of essential raw materials as well as processors and suppliers of mineral products.

The sometimes opposing tendencies for the new states of the FSU to seek both mineral self-reliance and greater cooperation among themselves were evident. The realities regarding the location of mining, processing, and consumption within the FSU as well as the fact that to export minerals the FSU states often have to rely on railroads, roads, and pipeline systems through each other's countries coupled with other political and economic issues were forcing greater cooperation.

The entire mining and metallurgical industry of the FSU is in need of investment to maintain and modernize facilities, to develop new mines and processing plants, and to improve pollution controls. During the Soviet period, the mining and metallurgical sector lacked the state-of-the-art technology and pollution controls of mineral industries in advanced market economy countries. Furthermore, the economic downturn following the breakup of the Soviet Union exacerbated this situation as there was a sharp curtailment of investment needed to maintain mines, processing plants, transport networks, and other infrastructure. While output in all sectors could be greatly increased if new investment funds were available because there is now much underutilized capacity, profitable investment could be made only in those enterprises that meet the economic criteria for competing on domestic and world markets.

Investment now is occurring in a combination of forms. In the late Soviet period and for a time thereafter, the only investment opportunities were for joint ventures, where the foreign investor and FSU investor would become near equal partners. Now it is possible for Western investors to take more active or passive investment roles. For example, foreign investors in some sectors are allowed complete ownership and management of mineral enterprises, while in other enterprises foreign investors have chosen to be minority stock holders.

In the minerals sector, Western participation has taken a number of forms. The most prominent forms are investment in development of gold and oil deposits, metals trading, toll smelting, supplying equipment and raw materials to enterprises, purchasing shares of enterprises, and providing managerial and technical expertise.

While all countries of the FSU have created programs to solicit Western investment to develop a wide variety of mineral deposits, foreign investment in developing mineral

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deposits has been made almost exclusively in oilfields where the investment decisions apparently have been justified in part on the basis of the enormous reserves and in gold deposits because they appear to promise the quickest and safest return on investment.

All FSU mineral industries are developing processes for privatization. Depending on the country and industry, privatization may or may not involve government ownership of anywhere from a minority to a majority share of the industry. Privatization is generally conducted through the issuance of stock that are either purchased or allocated, depending on the circumstances, to employees and managers of the enterprise, local and national Government entities, and domestic and foreign purchasers.

Russia, among the major mineral producing countries, is furthest along in the process of privatization with practically all metals industries privatized in some form, while other countries still envisage government ownership of the majority of shares of certain major mineral industries.

Kazakstan has come upon a unique solution of placing enterprises under foreign management for a limited number of years in a system that combines foreign management with government ownership, foreign investment, and privatization. The enterprises involved comprise the majority of the major metal producers in Kazakstan. The foreign managers are investing in upgrading equipment and dealing with social and ecological problems, paying off debts, striving to increase production and profitability, and attracting investors in return for a percentage of the enterprise's profits and a share in the ownership of these enterprises. This approach of placing firms under foreign management was also being attempted to a more limited extent by other former republics, including Azerbaijan and Georgia.

Those FSU metals industries that have been able to integrate into world markets through exports, toll smelting, foreign investment, and foreign management have been best positioned to ameliorate the downturn that affected all FSU mineral industries.

It appears that metals industries that exported to foreign markets, but did not attract foreign investors, managers, or traders, while able to survive, still suffered significant production decreases as was the case with the Russian nickel ad gold industries.

It also appears that the current success of the FSU metals industries is proportional to their rate of participation in world markets through exports, toll smelting, foreign investment, and foreign management because so far there has been no significant revival of domestic demand within the FSU. This situation probably will persist for the near future. In the longer term, domestic demand should revive, and there will be a need for additional down-stream metal-processing and fabricating facilities. In addition to supplying domestic markets, these downstream facilities can provide value-added metals exports. However, owing to a lack of capital and the need to produce value-added products that meet world standards, the need for foreign investment will remain high..

Eastern and Central Europe.—From 1990 through 1995, commercial activity in Eastern Europe was characterized by a process of transition from centrally planned economic structures to market driven economic systems. The decentralization of economic and political institutions during this period also has had a destabilizing social effect in Eastern and Central Europe with the steady rise in unemployment. Ethnic aspirations were held under tight reign by the former communist governments in the region, which, in the case of Czechoslovakia, had led to the relatively peaceful dissolution of the country into the Czech and Slovak Republics, and, in the case of the former Yugoslavia, to a civil war among several of the constituent Republics. Conditions that apparently were common to all countries in the region following the dissolution of central economic planning were (1) initially declining industrial output — including that of the minerals industries, (2) high levels of residual underemployment, the reduction of which is often socially unacceptable in transitional stages moving from nonmarket to market economic conditions, (3) high levels of environmental pollution stemming from industrial point sources, and (4) generally outdated technology, equipment, and knowhow relative to European member states of the Organization for Economic Cooperation and Development (OECD).

Although all the countries of Eastern and Central Europe have a common history of central economic planning, the Czech Republic, Hungary, Poland, Slovakia, and Slovenia, have demonstrated the strongest determination to make structural transformations as quickly as possible to join the OECD Western European Community. The Czech Republic, Hungary, Poland, and Slovakia formed the Central European Free Trade Association (CEFTA) in December 1992 to accelerate the development of markets in member countries. On the other hand, the other countries in Eastern Europe have taken a more cautious approach toward reforms, retaining a greater degree of centralized control of social and economic processes.

The general trend of reducing production in the steel industries in Eastern Europe continued, mainly because of the dissolution of intra-CMEA trade, although some stabilization of production was discernible during 1994 and 1995. Eastern European steel producers, where possible, sought to find hard currency markets to export steel to maintain industrial operations and critical levels of employment following the dissolution of barter-based CMEA trade. In many cases, quotas were set for these goods in both EU and non-EU OECD European regions to prevent the flooding of their domestic markets with still very highly subsidized products. The relocation of some automotive component manufacturing industries, industry mergers, and/or joint ventures (e.g., Volkswagen-Skoda) from the EU area to the Czech Republic and Poland also stimulated the interest of EU steel producers in acquiring steel production capacities in these countries. In 1992, Lucchini Siderurgica S.p.A. of Italy acquired a controlling interest in Huta Warszawa of Poland; and, in 1995, Bekaert of Belgium reached an agreement with the Czech Republic to build and operate a

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80,000 ton-per-year steel wire plant in the Czech Republic.

Because of the civil war in the former Yugoslavia and subsequent international sanctions placed against Serbia and Montenegro, the relatively strong copper and lead and zinc mining and metallurgical industries of Serbia and Macedonia, which supplied Western Europe as well as some of the former CMEA countries with both metals and toll smelting and refining capacities, ground to a virtual halt.

Poland, however, has remained a major world mine, smelter, and refinery producer of copper and a major European mine and metals producer of lead and zinc. Reportedly, discussions between Poland's copper producer, KGHM, and potential OECD investors continued to proceed in fits and starts with the major obstacle being the social consequence of rapidly restructuring this giant enterprise with 28,000 employees. In 1995, KGHM officials indicated that privatization would be completed in 1997. In 1995, there was notable foreign interest and investment in gold deposits in Bulgaria, the Czech Republic, Hungary, and Slovakia.

The importance of the industrial minerals sector in the region became increasingly evident as Belgian, French, German, and Italian cement producers took advantage of investment opportunities in the CEFTA area in the early 1990's, notably the Czech Republic, Hungary, and Poland. EU firms such as Belgium's SA des Cimenteries CBR and Heidelberger Zement of Germany have invested in this region because of their relatively modern operations as well as large exploitable resources of limestone, gypsum, and other quarry products. These investments have poised EU companies to take advantage of potentially major infrastructure development in Eastern and Central Europe and also to sell lower cost but good quality construction materials in the European region of the OECD. Additionally, the EU investors would be in a good position to take advantage of similar developments in former centrally planned economy countries in other regions. In 1995, more than 60% of the cement industries in the CEFTA region were foreign owned and operated.

With the possible exception of Poland, activity in Eastern Europe's mineral fuels sector should be dominated for the foreseeable future by domestic production of low-grade coals for thermal electric power generation and by deliveries of natural gas and petroleum, largely from Russia and other members of the Commonwealth of Independent States (CIS). CIS exports of natural gas and petroleum to Eastern and Central European countries have accounted for up to 60% of the domestic primary energy consumed in these countries. Foreign investments in this sector included sales of coal desulfurization processes and more efficently designed electric powerplants.

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[1] The value of the Ecu is the weighted average, based on central rates, of a basket of 12 currencies against the U.S. dollar. The Jan. 1996 rate was Ecu0.76=US$1.00.

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THE MINERAL INDUSTRY OF

ALBANIA

By Walter G. Steblez

Chromite, copper, ferrochromium, nickeliferous iron ore, and petroleum refinery products were the chief mineral commodities that have been produced in Albania and, which until recently, constituted the dominant component of foreign exchange earnings. During the early 1990's, fundamental political, social, and economic changes began to emerge in the former centrally planned countries of Eastern Europe, which lead to the gradual development of market-based economic structures and democratic social and political organizations. To stimulate the development of the domestic market and promote foreign investment, the Government of Albania adopted a new mining code and new laws and regulations concerning foreign investment. The changes in the country's economic and political system generated foreign investment interest in the country's minerals industry. Since 1992, various foreign joint-venture and joint-exploration proposals with respect to the country's chromite, copper, petroleum deposits and processing facilities have been studied by Albania's mining authorities.

The environmental landscape of Albania is similar in kind, but not in degree, to that of other former centrally planned economy countries of Eastern Europe that were former members of the Council for Mutual Economic Assistance (CMEA). The more serious point sources of environmental pollution were industrial sites, such as mining, beneficiation, smelting and refining complexes (chromite, copper, iron ore, etc.), the Elbasan iron and steel plant, petroleum refineries, lignite-fired thermal electric power stations, and chemical plants.[1] With technology even further out of date than that at similar facilities in former CMEA countries, Albania's industrial facilities were not only less efficient than those in other Eastern European countries, but also more polluting. The chief distinction between heavy industry in Albania and that in other former Eastern European members of CMEA was that of scale, with Albania's industrial development having been significantly less extensive than that in the former CMEA countries. Consequently, the environmental pollution generated by domestic industries in Albania from 1950 to 1992 has been relatively minor. Moreover, relatively large areas of the country have been described as being entirely unaffected by environmental pollution.

Since the near total collapse of Albania's centrally planned economy in 1992, the mineral industry's production in all sectors and stages of operation remained marginal. Additionally, technical difficulties contributed to a decline in Albania's mining sector. These problems pertained largely to shortages of spare parts as well as the need for modern mining equipment. From 1986 to 1990, total capital invested in the minerals industry amounted to less than 2% of the total invested in Albania's economy during this period.[2] Substantial future gains in Albania's mineral output would depend largely on decisions regarding the overall direction of the country's economic development. *(See table 1.)*

In 1995, Albania's mineral industry remained entirely state-owned and operated. Table 2 lists the administrative bodies as well as subordinate units of production of the main branches of the country's mineral industry. The economic viability of many of these facilities may be doubtful and the final organizational structure of the industry must still be determined. *(See table 2.)*

Metal ores have been Albania's chief source of mineral wealth. Apart from the commodities reviewed in this report, Albania reportedly possesses numerous known, but undeveloped, alluvial deposits of heavy sands, containing zirconium and rare earths, as well as rutile and ilmenite.

Albania's bauxite deposits are mainly in the central part of the country, just east of Tirana, the country's capital, as well as in the Northern Alpine region near the former Yugoslav border. Bauxite reserves were estimated at about 12 million metric tons (Mt). The largest deposit at Daijti was reported to contain approximately 8 to 9 Mt of reserves with an average grade of 39% to 40% aluminum oxide, 13% silica, 6% sulfur, 4% to 5% calcium oxide, and 18.3% iron oxide. Only 50,000 to 60,000 metric tons per year (t/yr) of bauxite, reportedly, have been mined near Prrenjas, in the Librazhd District. Because of a lack of domestic alumina refining and aluminum smelting capacity, this limited quantity of domestically mined bauxite has been entirely designated for export.

Albania's chromite mining operations were the most important component of its mineral industry. From the late 1970's through the 1980's, Albania had been a leading world producer and exporter of chromite, usually ranked second in terms of exports and third in terms of production. Exports of chromite and ferrochromium have been vital earners of foreign exchange.

Although some chromite deposits and outcroppings can be found throughout Albania, the country's principal commercial chromite deposits are in the north-central and

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northern parts of the country in ultrabasic massifs in the Midrita area. The mainly podiform ore was mined at seven mining districts, of which Bulquize and Batra, about 30 kilometers (km) northeast of Tirana, represented about two-thirds of Albania's total production capacity. Albanian ore graded from 18% to 43% chromium oxide (Cr_2O_3). Lumpy ores grading 39% to 42% Cr_2O_3 and concentrates grading from 50% to 53% Cr_2O_3 have been designated for export. About 25% of the ore was suitable for direct shipment; the balance was divided equally for beneficiation and for shipment as feedstock for the Burrel ferrochromium plant. In recent years, chromite extraction had become more difficult because of the declining availability of ore suitable for open pit mining; the increasingly complex mining environment at underground operations, especially at the Bulquize Mine; and the need for modern machinery and equipment. However, the rapid decline in output from 1991 to 1993 largely was the result of the political revolution that occurred in the country during this period, followed by a rapid movement of the labor force away from many heavy industrial operations, including those in the mining and mineral processing sphere.

The situation in Albania's chromite mining and processing sector in 1994 and 1995 showed some improvement compared with that of 1993. The rise in production, however, was from a significantly lower base of output in 1993, 282,000 metric tons (t), compared with the much higher levels of production, about 1.0-1.2 million metric tons per year (Mt/yr), attained in the 1980's and in 1990.

During the late 1980's, Albania's output of copper ore had been about 1 Mt/yr), grading between 1.5% to 4% copper. All copper ore was mined underground. With the exception of the Rehove Mine and beneficiation plant in southeastern Albania, copper was mined, processed, smelted, and refined largely in the northern part of the country. The largest copper mining and beneficiation complex at Fushe Arrez had produced more than 320,000 t/yr of ore during the late 1980's. As in other sectors of Albania's economy, the fall of production in the copper industry in the early 1990's was reported to be partly the outcome of a radical change in Government policy that allowed workers to freely change their place of employment.

After beneficiation, copper concentrates were smelted at the Rubic and Gjegjan (Kukes) and Lac pyrometallurgical primary smelters. Refineries and rolling mills at Rubic and Lac have produced copper wire, the major part of which was exported. Because Albania had few private telephones, only a limited amount of copper had been consumed by the country's telecommunications industry.

Albania's commercial resources of lateritic nickeliferous iron ore were estimated at about 300 Mt. Yearly output in the 1980's ranged from 1 to 1.2 Mt of ore, of which about one-half was consumed at the Elbasan iron and steel works to produce pig iron, a small amount of steel, and salts of nickel and cobalt. The balance of the iron ore had been exported, largely to Czechoslovakia, until 1993. During several decades, Czechoslovakia had been the largest consumer of Albanian nickeliferous iron ore, with annual imports ranging from 200,000 to 350,000 t/yr of ore. Czechoslovakia processed Albanian ore at its Sered refinery, where nickel and cobalt were extracted. However, this refinery was closed in early 1993.

Deposits of commercial-grade nickeliferous iron ore were exploited in ultrabasic massifs, near Pogradec, in east-central Albania. The principal mines were at Prrenjas, Guri i Kuq, and Bitinska. The largest mining operation at Prrenjas in recent years produced about 600,000 t/yr of ore. The majority of Albanian ores are lateritic, grading about 35% to 45% iron, 1.4% nickel, and 0.05% cobalt. The Bitinska deposit was believed to contain considerable resources of lateritic ore, as well as silicate ores, but only the lateritic material has been mined.

Production of ore reportedly had ceased in 1994, owing to both depressed international demand and dated and inefficient production technology, and remained moribund in 1995. This resulted in the corresponding closure of the Elbasan nickel and cobalt refinery, as well as a large quayside stockpile of ore at the port of Durres.[3] Because of exposure to the elements, the quality of the ore in this stockpile reportedly had deteriorated during the past 2 years and was causing damage to the port's storage facilities.

From 1992 through 1993, the output of iron and steel at the Elbasan steel works, which was based on the use of domestic iron ore, declined sharply from the already low output levels of 1991, reportedly because of outdated and worn plant and equipment and the lack of available funds needed to import coking coal for the Elbasan steelworks. As a result, operations at the Elbasan iron-and-steelmaking facility during this period and through 1995 practically had ceased. Little data have been available relative to the future prospects of this operation.

During the 1980's, the trade returns of market economy countries showed occasional shipments of small lots of nickel matte, speiss, and nickeliferous residues. The construction of a nickel and cobalt plant at Elbasan was reported from about 1985. The completion of the plant, now closed, had been postponed for a number of years because of technical difficulties. However, it seemed fairly clear that some component of the Elbasan iron and steelworks, or of the new nickel and cobalt plant, has produced a commercially marketable grade of nickel carbonate for a number of years from domestic lateritic nickeliferous iron ores. This product has been exported to countries where it is used in much the same way as nickel oxide sinter--as a direct additive product in steelmaking. The same facility presumably produced cobalt salts, which

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also were destined for the export market.

Albania's industrial minerals sector remained in early stages of development. In recent years, Albanian officials indicated that future investment would be aimed at developing facilities to exploit the country's asbestos, fluorite, kaolin, magnesite, phosphate, and quartz deposits. In view of the Government's efforts to initiate work on modernizing the country's infrastructure, these developments appeared to be probable. Albania also produced sufficient amounts of sand, gravel, and dressed stone to meet its domestic needs.

In September 1993, the Government of Albania reported that about $18 million would be provided by the World Bank and $8 million by Kuwait for the renovation of 85 km of the country's automobile road system. The project was developed with the assistance of the World Bank and would involve many domestic as well as some foreign enterprises.[4] In the 1970's and early 1980's Albania produced lignite, hydroelectric power, natural gas, and petroleum in quantities that were sufficient for its relatively low domestic consumption and export. However, reduced hydroelectric power output resulting from several years of drought, a general downturn in petroleum production, and increasing indigenous energy requirements have caused Albania's energy status to become tenuous in recent years.

Albania's exploitable coal resources reportedly amounted to 158 Mt of low-calorie lignite. Lignite had been mined from thin seams, with reportedly outdated methods and a low level of mechanization. The entire output was onsumed domestically, mainly at thermal electric power stations.

Albania has about 17,300 km of highways, railroads, and waterways. The railroad system consisted of 509 km of 1.435-meter standard-gauge track and 34 km of narrow-gauge single track. The road system consisted of 6,700 km of highways and main roads and 10,000 km of forest and rural roads. About 60% of all domestic cargo was transported by truck, 35% by rail, and 2% by coastal shipping along the Adriatic Sea and sections of Lake Scutari, Lake Ohrid, and Lake Prespa. Nickeliferous iron ore mining areas at Prrenjas and Guri i Kuq were linked by rail to processing centers at Elbasan. The copper mining district at Shkoder was also rail-linked to the copper smelter and refinery at Lac. Albania has a 1,630-megawatt generating capacity, mostly from hydroelectric sources. The country's petroleum and natural gas sector had about 145 km of crude oil pipeline, 55 km of refinery products pipeline, and 64 km of pipeline for natural gas. Seaports were at Durres, Sarande, and Vlore, but most bulk-mineral cargoes were handled at Durres.

The future of the country's mineral industry in the context of market economics may depend on the Government's policies aimed at revitalizing the country's entire economy.

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[1]Albania: Building a New Economy, World Bank Report No. 12342-Alb, Washington, DC, 1994, pp. 70-79.

[2]FBIS May 27, 1993, p. 1; from ATA 1022 GMT May 26, 1993.

[3]Metal Bulletin, Nov. 5, 1992, p. 6; and, Mining Journal(London), Nov. 5, 1993, p. 315.

[4]SWB EEW/0299, Sept. 16 1993, P. WB1; from Gazeta Shqiptare, reported by ATA Sept. 7, 1993, 1015 GMT.

TABLE 1
ALBANIA: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity 2/		1991	1992	1993	1994	1995 e/
METALS						
Bauxite e/		20,000	4,000	2,000	2,000	1,000
Chromium:						
Chromite, gross weight e/	thousand tons	587	322	281 r/	223 r/	243 7/
Marketable ore	do.	121	58	82	107 r/	129 7/
Concentrate	do.	88	15	33	11 r/	31 7/
Ferrochromium	do.	25	15	35 r/	33 r/	43 7/
Cobalt: e/						
Mine output, Co content 3/		600	20	10	–	–
Plant production, Co content 4/		15	3	1	–	–
Copper:						
Ore:						
Gross weight	thousand tons	566	240	239 r/	277 r/	258 7/
Concentrate e/		16,500	4,000	14,000 r/	9,000 r/	17,000 7/
Cu content e/		3,700	900	3,200 r/	2,000 r/	3,800
Metal, primary:						
Smelter		4,800	2,300 r/	2,300 r/	2,000 r/	3,000 7/
Refined e/		4,400	1,500 r/	1,500 r/	1,000	1,000
Iron and steel:						
Iron ore, nickeliferous:						
Gross weight	thousand tons	750 e/	200	150	–	–
Fe content e/	do.	350	88	85	–	–

See footnotes at end of table.

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TABLE 1--Continued
ALBANIA: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity 2/		1991	1992	1993	1994	1995 e/
METALS--Continued						
Iron and steel--Continued:						
Metal:						
Pig iron		50,000 e/	10,000	10,000	10,000	10,000
Crude steel e/		35,000	5,000	5,000	5,000	5,000
Rolled steel e/		30,000	1,000	1,000	1,000	1,000
Nickel: e/						
Mine output, Ni content		7,500	150	75	75	--
Plant production, Ni content		5,000	100	50	50	--
Metal Ni cathode		2,200	50	20	20	--
INDUSTRIAL MINERALS						
Cement, hydraulic e/	thousand tons	600	200	200	200	200
Clay, kaolin e/		2,000	500	500	500	500
Dolomite e/		350,000	50,000	50,000	50,000	50,000
Fertilizer, manufactured: e/						
Phosphatic		75,000	10,000	10,000	10,000	10,000
Urea		25,000	4,000	4,000	4,000	4,000
Nitrogen, N content of ammonia e/		80,000	15,000	15,000	15,000	15,000
Olivinite		45,000 e/	300	300	300	300
Phosphate rock (12% to 15% P2O5) e/		9,000	1,500	1,500	1,500	1,000
Pyrite, unroasted e/		23,000	7,000	7,000	7,000	5,000
Salt e/		55 000	5 000	10 000	10 000	10 000
Sodium compounds n.e.s., soda ash, calcined e/		16,000	150	150	150	100
Sulfuric acid e/		50,000	1,000	1,000	1,000	1,000
MINERAL FUELS AND RELATED MATERIALS						
Asphalt and bitumen, natural e/ 5/	thousand tons	500	100	100	100	100
Coal, Lignite	do.	1,100 e/	500	500	500	500
Gas, natural, gross production 6/	million cubic meters	170 e/	100	100	100	100
Petroleum:						
Crude:						
Gross weight	thousand tons	700 e/	500	586 r/	535 r/	521 7/
Converted	thousand 42-gallon barrels	4,670 e/	3,300	3,900 r/	3,500 r/	3,500
Refinery products e/		3,000	1,000	1,000	1,000	1,000

e/ Estimated. r/ Revised.

1/ Table includes data available through May 1996.

2/ In addition to the commodities listed, a variety of industrial minerals and construction materials (common clay, quartz, titanomagnetite, stone, and sand a gravel) are produced, but output is not reported quantitatively, and available information is inadequate to make reliable estimates of output levels.

3/ Calculated from reported and estimated weight of nickeliferous ore; the amount of cobalt recovered, if any, is conjectural.

4/ Figures represent cobalt content of estimated production of commercially marketable cobalt salts produced within Albania from domestically mined nickeliferrous iron ore.

5/ Includes petroleum refinery produced asphalt and bitumen.

6/ Separate data on marketable production are not available, but gross and marketed output are regarded as nearly equal.

7/ Reported figure.

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TABLE 2
ALBANIA: STRUCTURE OF THE MINERAL INDUSTRY FOR 1995

(Thousand metric tons unless otherwise specified)

Commodity		Location of main facilities (all state-owned)	Annual capacity
Cement		Elbasan, 32 kilometers southeast of Tirana; Kruje, 20 kilometers northwest of Tirana; Shkoder, 85 kilometers northwest of Tirana; and Vlore, southwest of Tirana	1,200
Chromite		Bater (including Bater I and II and Martanesh), 40 kilometers northwest of Tirana	450
Do.		Bulquize (including Bulqize south, Fush, Ternove, and Todo Maco), 35 kilometers northwest of Tirana	450
Do.		Kalimash, 60 kilometers north of Tirana	250
Do.		Kam, 70 kilometers north of Tirana	100
Do.		Klos, 20 kilometers northeast of Tirana	50
Do.		Pogradec (including Katjiel, Memelisht, Pojske, Pishkash, and Prrenjas), 50 kilometers east of Tirana	100
Ferrochromium		Burrel, 35 kilometers northeast of Tirana	40
Do.		Elbasan, 32 kilometers southeast of Tirana	36
Copper:			
Ore		Fushe-Arrez, 80 kilometers north of Tirana	350
Do.		Gjejan, 100 kilometers northeast of Tirana	150
Do.		Golaj (including Nikoliq and Pus), 120 kilometers northeast of Tirana	150
Do.		Kurbnesh-Perlat, 55 kilometers northeast of Tirana	100
Do.		Rehove, 110 kilometers southeast of Tirana	100
Do.		Reps (including Gurch, Lajo, Spac, and Thurr), 55 kilometers north of tirana	350
Do.		Rreshen, 50 kilometers north of Tirana	50
Do.		Shkoder (including Palaj, Karma I and II), 85 kilometers northwest of Tirana	100
Smelter		Kukes, 110 kilometers northeast of Tirana	6
Do.		Lac, 35 kilometers northwest of Tirana	7
Do.		Rubik, 50 kilometers north of Tirana	4
Iron ore		Prrenjas (Bushtrica, Prrenjas, Skorska I and II), 70 kilometers southeast of Tirana	650
Do.		Guri i Kuq (including Cervenake, Grasishta, Guri i Kuq, Hudenisht and Guri Pergjrgjur), 25 kilometers east of Tirana	500
Steel		"Steel of the Party" Metallurgical Combine at Elbasan	150
Nickel, smelter		Elbasan	6
Coal, lignite		Maneze, Mezes, and Valias Mines in Tirana Durres area; Krabe Mine, 20 kilometers southeast of tirana; Alarup and Cervnake Mines, in Pogradec area, 80 kilometers southeast of Tirana; Mborje-Drenove Mine in Korce area, 85 kilometers southwest of Tirana; and Memaliaj Mine in Tepelene area, 110 kilometers south of Tirana	2,500
Natural gas	million cubic feet	Gasfields on southwest Albania between Ballsh and Fier	16,000
Petroleum:			
Crude	42-gallon barrels per day	Oilfields at Marineze, Ballsh, Shqisht, Patos, Kucova, Gorrisht, and others	35,000
Refined	do.	Refineries: Ballsh, Cerrik, Fier, and Stalin	33,000

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THE MINERAL INDUSTRY OF

ARMENIA

By Richard M. Levine

Armenia's mineral industry in recent years was primarily involved in mining nonferrous and industrial minerals. Armenia has large molybdenum reserves and was mining one-third of the former Soviet Union's (FSU) output of molybdenum. The molybdenum was associated with copper. Armenia also mined copper-zinc deposits. It has a native gold mining industry and its nonferrous ore byproducts include barite, gold, lead, rhenium, selenium, silver, tellurium, and zinc.

The nation has a large industrial minerals industry and was the largest producer of perlite in the FSU. It produced a number of other industrial minerals, including clays, diatomite, dimension stones, limestone, salt, and semiprecious stones, and has a diamond cutting plant. Armenia, reportedly, also has significant high quality iron ore reserves, which have not yet been exploited. However, Armenia had practically no mineral fuel production in 1995 and was dependent on imported mineral fuels.

In 1995, Armenia was making the effort to attract investment in its mineral industry. It held an open tender that closed October 10, 1995, for the right to mine 33 deposits including gold; ferrous and nonferrous metals; perlite; semiprecious, decorative, and facing stones; tuffs; and zeolite.

One of Armenia's major problems has been the lack of discovery of any significant oil and gas reserves. There are some indications that Armenia could have significant oil and natural gas reserves at a depth of 10 kilometers (km), but current exploration reportedly has been conducted to a depth of only 5 km. In 1995, efforts were underway to explore for and assess coal resources as a potential domestic fuel source. Some new coal deposits have been discovered and the U.S. Geological Survey (USGS) under an agreement with the U.S. Agency for International Development (USAID) was assisting Armenia in the exploration and assessment of coal resources. The USGS is to supply Armenia with geophysical and drilling equipment, establish laboratories in Armenia for coal quality analysis and assessment, and train Armenian specialists at USGS centers and in Armenia.

In 1995, Armenia for the first time reported positive growth indicators for all major economic indices. In comparison with 1994 the gross domestic product (GDP) rose 6.9%, national income rose 5.8%, and industrial production rose 3.4%.

In 1995, Armenia reported a 66% increase in output in its mining and metallurgy sector compared with 1994, experiencing a reversal in the situation in which production of all mineral commodities in Armenia had fallen sharply since the breakup of the Soviet Union. The economic disruptions caused by the dissolution of the FSU had been exacerbated in Armenia because of blockades and disruptions in supplies because of the warfare and tensions in neighboring Azerbaijan in and around the predominately Armenian region of Nargorno Karabakh, political and military disturbances in neighboring and nearby regions of Georgia and the North Caucasus, and difficulties for Armenia establishing beneficial economic and political relations with neighboring Turkey. Problems with Turkey were due in part to Armenia's tensions with Azerbaijan over Nagorno Karabakh. The increase in mineral output in 1995 was attributed in part to Armenia's mining and metallurgical enterprises receiving needed chemicals to produce copper and molybdenum concentrates from the neighboring State of Iran. In exchange, the Armenian concentrates were sent to Iran for processing.

Plans for 1996 called for increasing capacity at the Yerevan aluminum plant that produces rolled aluminum and aluminum foil, beginning design work for a rebuilding a copper smelter in Alaverdy, and beginning construction of a gold refinery in Yerevan.

Besides mining copper, Armenia had a large copper smelter at Alaverdy with a 50,000 metric tons per year (t/yr) capacity that was closed in the late 1980's for environmental reasons. Plans now call for reopening a smelter in Alaverdy and building a new smelter with a 25,000 t/yr to 30,000 t/yr capacity in the Zangezur mining region. Both smelters would be supplied from domestic deposits.

Armenia's state diamond cutting company, Shogakn, with a diamond-cutting plant in Nor Achin utilizing both gem and industrial diamonds imported from Russia and also made diamond jewelry. In 1995, Shokagn reportedly had a supply quota set by Russia of 64,500 carats of rough gem diamonds and 600 carats of polished diamonds. The diamonds imported from Russia by agreement must be processed by Shogakn.

In 1995, gold production in Armenia was only about 100 kilograms which was a significant decrease from the 2 metric tons (t) that Armenia produced in 1991. Armenia has explored four gold lode deposits, but only one, the Zod

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deposit 150 km east of Yerevan, was being exploited. About one-third of Armenia's gold production had come from processing of polymetallic base metal ores. Zod ores were sent to the Ararat plant 60 km from Yerevan for processing. Armenia's state-owned gold mining concern Armzoloto was engaged in discussions with potential foreign partners to develop Armenia's 1996 budget called for increased exploration of gold deposits, particularly the Lusadzor and Megradzor lode deposits, and completing exploration of the polymetallic Shaumyan deposit containing cadmium, copper, gold, and silver.

Despite Armenia's sizable molybdenum and copper reserves, foreign investors have shown the greatest interest in gold development. This situation could change as Armenia achieves greater stability in its relations with neighboring States and continues to stabilize its economy. Armenia may then be able to attract greater interest in investment in its base metals and industrial minerals.

OTHER SOURCES OF INFORMATION

Minstry of Economy
1 Government Building
Republic Square
Yerevan, 375010, Armenia
Telephone (374-2) 527-351
Fax (374-2)151-069

Foreign Investments Department
Telephone (374-2) 527-351
Fax (374-2) 524-332, 151-069

Ministry of Energy
2 Government Building
Republic Square
Yerevan, 375010, Armenia
Telephone (374-2) 521-964
Fax (374-2) 151-089

Ministry of Industry
2 Government Building
Republic Square
Yerevan, 375010, Armenia
Telephone 374-2) 521-877, 520-579
Fax (374-2) 151-084, 523-564

Ministry of Ecology and Mineral Resources
37 Moskovyan St.
Yerevan, 375002, Armenia
Telephone (374-2) 530-741
Fax (374-2) 534-902, 538-613

TABLE 1
ARMENIA: STRUCTURE OF THE MINERAL INDUSTRY FOR 1995

(Metric tons unless otherwise specified)

Commodity	Major operating facilities	Location of main facilities	Annual capacity e/
Copper, Cu content of ore	Kafan copper mining directorate	Kafan	10,000,000 1/
Do.	Shamlug mining directorate	Shamlug	
Do.	Akhtala mining directorate	Akhtala	
Do.	Zangezur copper-molybdenum complex mining Kadzharan deposit	Kadzharan	
Do.	Agarak copper-molybdenum mining and processing complex	Agarak	
Gold	Zod mining complex	Zod	2 2/
Do.	Megradozor deposit	Megradzor	
Molybdenum (Mo content of ore)	Zangezur copper-molybdenum complex mines Kadzharan deposit	Kadzharan	5,000 2/
Do.	Agarak copper-molybdenum mining complex	Agarak	
Perlite	Aragats mining and beneficiation complex	Aragats	200,000

e/ Estimated
1/ Copper content of ore total from all enterprises.
2/ Total for both enterprises.

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THE MINERAL INDUSTRY OF

AUSTRIA

By Harold R. Newman

On January 1, 1995, Austria acceded to the European Union (EU). Accession was expected to spur investment, employment and growth for the country's general economy and, in particular, its mineral industry, both by providing access to the single market and by fostering policies to promote competition and dismantle protectionism. Dependent on foreign trade, Austria has had an open economy closely linked to the economies of other EU member countries, especially Germany.

The mining industry traditionally has been very popular in Austria. However, the metal mining sector continues to decline, principally due to high costs, low ore grades, environmental problems, and increased competition. This was not the case with the industrial minerals sector, which has been producing a number of important minerals. Austria has been considered a significant world producer of graphite, magnesite, and talc. Recycling activities were also increasing. *(See table 1.)*

The Austrian mineral industry, in the last several years, has turned away from coal and base-metal mining toward the industrial minerals sector and this is expected to continue. The Government has closed all its metalliferous mines, except for the iron ore operation at Erzberg, and discontinued the operation of unprofitable smelters. A small and diminishing portion of the mineral industry is still under Government control. The Mittersill tungsten mine was reopened in 1995 after being closed for 2 years for economic reasons. (*See table 2.*)

Only secondary aluminum was produced in 1995. The Ranshofen smelter, with a capacity of 50,000-metric-tons-per-year (t/yr), is the larger of two secondary smelters. The Government-owned facility was scheduled to be privatized by 1998. The operation consisted of a smelter and casthouse, a rolling mill, a press mill, and an automobile wheel plant. Scrap was obtained from private collecting organizations.

At the smaller Lend smelter, indigenous scrap is augmented with imported ingots depending on particular requirements of the finished products. The facility consisted of a 15,000 t/yr smelter, two casthouses, a crucible furnace, three oil-fired furnaces, and a closed furnace. Fuel and compressed air tanks were the main products.

The secondary copper smelter at Brixlegg relied on copper and copper alloy scrap from domestic sources as well as scrap imports from Germany and Italy. The company's modernization project, increasing the capacity of the casthouse to 75,000 t/yr, was completed.

The Steirischen Erzberg Mine of Voest-Alpine Erzberg GmbH was the only iron ore mine operating in 1995. The open pit mine was reported to have estimated proven and probable ore reserves, grading 31% iron and about 2% manganese, amounting to about 25 million metric tons (Mt) and 150 Mt respectively. The beneficiated ore is shipped by rail to the nearby Donawitz and Linz steel mills of Voest-Alpine Stahl GmbH for the production of self-fluxing sinter, averaging 50% iron and 3% manganese.

The Donawitz steel plant was equipped with three blast furnaces with a total capacity of 2 Mt/yr, three basic oxygen converters (1.2 Mt/yr capacity) and two continuous casting machines. The Linz steel plant had five blast furnaces (2.99 Mt/yr capacity), three basic oxygen converters (3.35 Mt/yr capacity), two continuous casting machines, and several rolling mills. The Government was proceeding with plans to privatize both operations.

The Mittersill Mine of Inmet Mining Corp., on standby status since 1993, was activated in early 1995 and was reported, at yearend, to have reached its full capacity of 1,700 t/yr of tungsten trioxide contained in scheelite concentrates. The company was forecasting a mine life of between 15 to 20 years.

Most of the growth in the mineral resources area in Austria has been in the production of industrial minerals where operations have been developed by the private sector.

There are ample supplies of calcite, dolomite, and limestone to support a viable cement industry. Perlmooser Zementwerke AG (PZ), with three plants, was the largest company. PZ's largest plant, at Mannesdorf near Vienna, had a 1.4 t/yr capacity, accounting for about 65% of the annual domestic cement production.

Austria is one of the worlds largest sources of high-grade graphite. Grafitbergbau Kaiserberg AG operates open pit mines at Kaiserburg and at Treiben. Grafitbergbau's 30,000 t/yr capacity processing plant at Kaiserburg consists of drying, classification, milling, flotation, and fine grinding sections. The other company involved in graphite production is Industrie und Bergbaugesellschaft, Pryssok & Co. KG, which operates the Trandorf open pit mine at Mühldorf.

Veitsch-Radex AG (VRAG) was the largest producer of magnesite in Austria. Three of its five mines were active

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in 1995: Breitenau, Hochfilzen, and Radentheim. With an output of about 400,000 t/yr, Breitenau is VRAG's largest operation. Radentheim, the smallest with an output of 80,000 t/yr, produces a high iron magnesite. VRAG's dead burned magnesia capacity is very large, exceeding 400,000 t/yr. The iron and steel industry was the largest consumer of VRAG's products.

Austrian salt mines were owned by the Government and regulated by the Ministry of Finance. All salt output was from three underground mines and one brine well in central Austria. The Government was proceeding with plans to privatize the operations.

Luzenac Naintsch, the only producer of talc in Austria, operated three mines in the Styria region and produced a range of talc, chloritic talc, dolomite talc, and chlorite-mica-quartz ores. The Rabenwald open pit mine is the largest, with a capacity of about 110,000 t/yr of talc and chloritic talc. The Lassing underground mine has a capacity of 30,000 t/yr producing a dolomite-talc product with a high degree of whiteness. The Weisskirchen underground mine has a capacity of 30,000 t/yr and produces an ore containing chlorite, muscovite mica, and quartz.

In the coal mining sector, the open pit Oberdorf Mine of Graz-Koflacher Eisenbahn und Bergbaugesellschaft GmbH's lignite operations was expected to remain in production through 1996. The company oversees production from two adjacent pits. All production was used exclusively by a local powerplant. Additional coal for thermal power stations was imported from Australia and Poland.

Austria is a landlocked country and nearly all transportation is on railroads and highways. The total length of railroad consisted of 5,410 kilometer (km) of standard-gauge and 339 km of narrow-gauge tracks. About 98% of the railroad was Government-owned and more than 50% was electrified. The length of roads totaled 95,412 km, of which 34,612 km were primary highways while the rest were unpaved communal roads. The only navigable river was the Danube, with ports in Linz and Vienna.

Because of Austria's long history of minerals exploration and mining tradition, geologic conditions are well known. Future mining activities will most probably be concentrated in industrial minerals, mainly for domestic consumption.

TABLE 1
AUSTRIA: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons, unless otherwise specified)

Commodity		1991	1992	1993	1994	1995 e/
METALS						
Aluminum metal:						
Primary		80,384	32,866	--	--	--
Secondary		33,600	45,400	43,300	52,500	51,600
Total		113,984	78,266	43,300	52,500	51,600
Cadmium, metal		19	--	--	--	--
Copper:						
Smelter, secondary		44,758	48,975	46,856	49,562	53,400
Refined:						
Primary		8,079	5,705	5,871	2,904 r/	1,500
Secondary		44,758	48,975	46,856	49,562 r/	50,000
Total		52,837	54,680	52,727	52,466 r/	51,500
Germanium, Ge content of concentrate	kilograms	5,000 e/	--	--	--	--
Gold, metal	do.	60	158	315	382	100
Iron and steel:						
Iron ore and concentrate:						
Gross weight	thousand tons	2,130	1,627	1,427	1,653	2,116 2/
Fe content	do.	481	510	448	390	510
Metal:						
Pig iron	do.	3,442	3,074	3,070	3,362	3,878 2/
Ferroalloys, electric-furnace e/	do.	12	12	12	431 2/	454 2/
Crude steel	do.	4,186	3,953	4,149	4,399	4,400
Semimanufactures	do.	3,500 e/	3,360	3,450	3,500	3,200
Lead:						
Mine output, Pb content of concentrate		1,915	1,715	2,047	--	--
Metal:						
Smelter:						
Primary		5,500 e/	3,800 e/	2,000	--	--
Secondary		14,600 e/	17,800 e/	18,800	17,200	18,000
Total		20,100	21,600	20,800	17,200	18,000

See footnotes at end of table.

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TABLE 1--Continued
AUSTRIA: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons, unless otherwise specified)

Commodity		1991	1992	1993	1994	1995 e/
METALS--Continued						
Lead--Continued:						
Metal--Continued:						
Refined:						
Primary		6,350	5,730	4,780	--	--
Secondary		16,300	18,200	17,900	17,165 r/	18,000
Total		22,650	23,930	22,680	17,165 r/	18,000
Manganese, Mn content of domestic iron ore		39,925	30,752	26,890	31,288 r/	30,000
Silver, metal		29	22	-- r/	24	--
Tungsten, mine output, W content of concentrate		1,380	1,730	120	--	188
Zinc:						
Mine output, Zn content of concentrate		16,354	15,787	20,014 e/	--	--
Metal, primary, refined		15,900	5,537	6,838	--	--
INDUSTRIAL MINERALS						
Cement, hydraulic	thousand tons	5,020	5,031	4,941	5,000 e/	5,000
Clays:						
Illite	do.	217	276	300	267	250
Kaolin:						
Crude	do.	352	344	342	469	437 2/
Marketable	do.	72	65	64	87 e/	75
Other	do.	3,460	3,450	2,990	2,981	2,900
Feldspar, crude		10,429	11,059	8,492	4,883	5,000
Graphite, crude		19,800	19,796	4,146	12,324	12,000
Gypsum and anhydrite, crude	thousand tons	655	792	876	1,070	1,000
Lime	do.	1,600 e/	1,720	1,810	1,850	1,800
Magnesite:						
Crude	thousand tons	961	995	649	681	784 2/
Sintered or dead-burned	do.	337	223	323	240	350
Caustic calcined	do.	57	54	50	76	50
Nitrogen, N content of ammonia e/		410	410	400	400	400
Pigments, mineral, micaceous iron oxide		10,200	9,480	8,400	8,000 e/	8,000
Pumice (trass)		8,200	7,490	9,100	5,670	6,000
Salt:						
Rock	thousand tons	1	1	1	1	1
In brine	do.	698	662	695	701 r/	700
Sand and gravel:						
Quartz sand	do.	2,090	5,880	4,300	6,457	7,503 2/
Other sand and gravel	do.	17,000	17,400	16,900	58,000	50,000
Total	do.	19,090	23,280	21,200	64,457	57,503
Sodium compounds, n.e.s.: e/						
Soda ash, manufactured	do.	150	150	150	150	200
Sulfate, manufactured	do.	120	120	120	120	100
Stone: 3/						
Dolomite	do.	5,090	5,870	7,770	8,159	8,790 2/
Quartz and quartzite	do.	464	511	429	416	395
Other:						
Limestone and marble	do.	15,400	19,300	19,600	19,993	19,080
Basalt	do.	3,670	4,100	3,360	4,092	4,202 2/
Marl	do.	2,780	2,640	2,840	2,306	1,931 2/
Crushed stone	do.	10,700	10,600	11,500	27,000	15,000
Total	do.	38,104	43,021	45,499	61,966	49,398
Sulfur, byproduct:						
Of metallurgy e/		10,700	8,200	9,296 r/	9,500	8,000
Of petroleum and natural gas		7,140	8,683	7,656	9,266	9,000
Total		17,840	16,883	16,952	18,766	17,000
Talc and soapstone, crude		161,425	145,664 r/	136,640	154,647 r/	131,600
MINERAL FUELS AND RELATED MATERIALS						
Coal, brown and lignite	thousand tons	2,080	1,753 r/	1,691	1,372	1,251 2/
Coke	do.	1,540	1,490 r/	1,400	1,400 e/	1,400

See footnotes at end of table.

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TABLE 1--Continued
AUSTRIA: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons, unless otherwise specified)

Commodity		1991	1992	1993	1994	1995 e/
MINERAL FUELS AND RELATED MATERIALS--Continued						
Gas, natural:						
Gross	million cubic meters	1,330	1,440	1,488	1,355 r/	1,482 2/
Marketed e/	do.	1,100	1,100	1,100	1,000	1,000
Oil shale		290	430	195	1,146	1,078 2/
Petroleum:						
Crude	thousand 42-gallon barrels	8,930	8,230	8,060	7,671	7,670
Refinery products:						
Liquefied petroleum gas	do.	7,840	7,380	6,760	4,292	6,960
Gasoline	do.	20,500	19,500 e/	19,000 e/	21,598	17,680
Kerosene and jet fuel	do.	3,030	3,240	3,140	2,929	3,309
Distillate fuel oil	do.	11,900	12,900	12,800	9,064	8,736
Lubricants	do.	8,280	6,910	8,670	280 e/	--
Residual fuel oil	do.	11,800	11,700	11,000	11,000 e/	11,000
Bitumen	do.	1,760	1,120	1,660	1,500 e/	1,500
Unspecified	do.	714	787	739	628	630
Refinery fuel and losses	do.	2,000	2,470	2,240	2,102	2,310
Total e/	do.	67,824 2/	66,007	66,009	53,393	52,125

e/ Estimated. r/ Revised.
1/ Table includes data available through May 1996.
2/ Reported figure.
3/ Excluding stone used by the cement and iron and steel industries.

TABLE 2
AUSTRIA: STRUCTURE OF THE MINERAL INDUSTRY FOR 1995

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity
Aluminum	Salzburger Aluminum GmbH	Smelter at Lend	15
Do.	Austria Metall AG (Government 100%)	Smelter at Ranshofen	50
Cement	Perlmooser Zementwerke AG	Plants at Kirchblich, Mannesdorf, Retsnei, and Rodaun	3,000
Do.	Gebr Leube Portlandzementwerke	Plant at Gartenau	700
Do.	Zemenwerke Eiberg	Plant at Eiberg	600
Do.	Wietersdorfer Zemenwerke	Plant at Wietersdorf	600
Coal	Graz-Koflacher Eisenbahn und Bergbaugesellschaft mbH (Government 100%)	Oberdorf Mine	1300
Do.	Salzach-Kohlenbergbau Gesellschaft m.b.H. (Government 100%)	Trimmelkam Mine	100
Copper	Austria Metall AG (Metal Mining Corp. of Canada 41%, Mount Isa Mines of Australia 41%, and Government 18%)	Plant at Brixlegg	75
Graphite	Industrie und Bergbaugesellschaft Pryssok & Co KG	Trandorf Mine at Mühldorf	15
Do.	Grafitbergbau Kaisersberg Franz Mayr-Melnhof & Co	Kaisersberg Mine	3
Do.	Grafitbergbau Trieben GmbH	Trieben Mine	3
Gypsum	Erste Salzburger Gipswerk-Gesellschaft Christian Moldan KG	Abtenau and Moosegg Mines	300
Do.	Rigips Austria GmbH	Grundlsee, Puchberg, Unterkainisch, and Weisenbach Min	250
Do.	Knauf Gesellschaft mbH	Hinterstein Mine	160
Iron ore	Voest-Alpine Erzberg GmbH (Government 100%)	Erzberg Mine at Eisenerz	2,000
Lead	Bleiberg Bergwerks-Union AG (Metall Gesellschaft 74%)	Smelter at Brixlegg	55
Magnesite	Veitsc - Radex AG	Mines at Breitenau, Hochfilzen and Weissenstein	600
Do.	Radex Austria AG (Osterreichische Magnesit AG 100%)	Millstatteralpe Mine	250
Natural gas million cubic meters	Osterreichische Mineralolverwaltung AG (Government 100%)	Fields in Vienna Basin	1,500
Steel	Voest-Alpine Stahl GmbH (Government 100%)	Plants at Donawitz and Linz	4,500
Talc	Naintsch Mineralwerke	Mines at Lassing, Rabenwald, and Weisskirchen Plants at Oberfeistitz and Weisskirchen	160
Tungsten	Wolfram Bergbau und Hüttengesellschaft mbH.	Mittersill Mine, Salzburg; conversion plant, Bergla	350

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THE MINERAL INDUSTRY OF

AZERBAIJAN

By Richard M. Levine

Azerbaijan, since Czarist-times, has been an oil and gas producer and has had a petroleum refining industry. Azerbaijan is also a producer of iron ore, alunite, alumina and aluminum, copper and molybdenum ore, lead and zinc ore, and industrial minerals including iodine and bromine, clays, gypsum, limestone, marble, decorative building stone, sand and gravel, and precious and semi-precious stones.

The country's most significant reserves in terms of value are its oil reserves; a number of foreign firms are involved in negotiations and projects to develop these reserves. Azerbaijan also has numerous other mineral resources, including such metals as alunite, arsenic, cobalt, copper, chromite, iron ore, lead and zinc, manganese, mercury, molybdenum, and tungsten; industrial minerals and nonmetallic minerals, such as barite, clays, refractory-grade dolomite, gypsum, kaolin, limestone, pyrite, salt, and zeolites; and semiprecious stones, including amethyst, andalusite, and garnet, as well as a range of building materials.

In 1995, gross domestic product (GDP) decreased by 17.2% and industrial production by 21.4% compared with 1994, continuing the decline which has lowered the GDP in 1995 by 62% compared with that of 1990. Especially hard hit have been the metals and chemical sectors as iron and steel output is only 4% of its 1990 level, nonferrous metals output 8%, and chemical and petrochemical output 20%. Fuel output fell the least which in 1995 was 61% of the 1990 level. Azerbaijan reached its 1995 production target for its main mineral product, crude oil, with output of 9,161,300 metric ton (t). Natural gas production reportedly was 6,643,900 cubic meters. Oil production, however, was 6.2% less and gas production 4.2% less compared with 1994.

Azerbaijan produced alumina from native alunite ore mined from open pits. It normally required about 6 t of alunite ore to produce 1 t of alumina, and alunite processing is very energy-intensive compared with processing bauxite. Alunite processing was started under the former Soviet system that made mineral production a priority irrespective of production costs. Nevertheless, the 450,000-metric-ton-per-year (t/yr) capacity Gyandzha refinery in Azerbaijan, originally built to process alunite, was expanded in the late 1970's to process imported bauxite rather than alunite. Presently, only one section at Gyandzha, with a capacity to produce 100,000 t/yr of alumina, processes alunite. The alumina from Gyandzha was shipped to the Sumgait aluminum smelter in Azerbaijan and to the Tajik aluminum smelter in Tajikistan. The United Kingdom's Trans World Metals, which is one of the major foreign firms involved in the production and sales of Russian aluminum, was planning to acquire the Gyandzha alumina refinery. The refinery in 1995 reportedly produced only 27,000 t of alumina. Azerbaijan also has an aluminum smelter at Sumgait with capacity to produce about 60,000 t/yr of aluminum.

In 1994, Azerbaijan signed an agreement with representatives of a consortium of foreign oil companies to develop the Azeri, Chirag, and Gyuneshli offshore oilfields. Issues regarding the transport route for oil produced from these fields had been a major unresolved issue. The apparent solution reached was that first oil produced from these fields would be transported for export via two routes, one north through Russia to the Russian port of Novorossiyysk and one via Georgia to the port of Supsa. An agreement was also reached in 1995 that an additional pipeline would be constructed that would run from Azerbaijan through Georgia to Turkey. In 1995 exports of petroleum products reportedly increased by 250,000 t compared with 1994 to 1.4 million metric tons (Mt), with most petroleum product exports going to Iran.

In 1995, Azerbaijan's state oil company, SOCAR, signed an agreement to develop the Karabakh oilfield in the Caspian Sea with Russia's LUkoil company, Italy's Agip S.P.A., and the United States Pennzoil Co. About 100 Mt of crude oil reportedly will be produced from Karabakh over a 30-year period.

It appears that solutions to a number of the country's oil transport problems have been reached; Azerbaijan is now poised to gain significant revenue through the development of its hydrocarbon resources. Development of Azerbaijan's other metallic and industrial mineral industries now will have to be scrutinized in terms of market economic factors.

OTHER SOURCES OF INFORMATION

Ministry of the Economy
Government House
6, S. Vurgun St.
Baku 370016
Azerbaijan
Telephone: 99-412 93 20 25

Ministry of Foreign Economic Relations
68, Lermontov St.
Baku 370066
Azerbaijan
Telephone: 99-412-92 94 92/92 05 48/92 93 90

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TABLE 1
AZERBAIJAN: STRUCTURE OF THE MINERAL INDUSTRY FOR 1995

(Metric tons unless otherwise specified)

Commodity	Major operating companies	Location of main facilities	Annual capacity e/
Aluminum	Sumgait smelter	Sumgait	60,000.
Alumina	Gyandzha refinery	Gyandzha	450,000.
Alunite ore	Zaglik alunite mining directorate	Zaglik	600,000.
Cement	Karadag cement plant	Karadag	1,000,000 (total for both plants).
Do.	Tauz	Tauz	
Iodine and bromine	Baku, Karadag, Neftechala plants	Process oil well brines at plants in Baky, Karadag, and Neftechala	30,000 bromine, 100 iodine.
Iron ore, marketable	Dashkesan Mining Directorate	Dashkesan region	1,000,000.
Petroleum million tons	Produced at 40 deposits on land and 12 offshore deposits in Caspian Sea	Land deposits on Ashperon Peninsula, in the Nizhnekurin Valley and at the Muradkhanly and Zagly-Zegva deposits	12.
Natural gas billion cubic meters	do.	do.	10.

e/ Estimated.

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THE MINERAL INDUSTRY OF

BELARUS

By Richard M. Levine

In Belarus, mineral production consisted primarily of the mining of potash from the Starobinsk deposit, peat at deposits throughout the country, and the production of steel at one mini-mill in Zhlobin with a capacity of over 1.1 million metric tons per year (Mt/yr) of crude steel. Belarus also produced some oil, natural gas, and construction materials and had a large petroleum refining sector with refineries at Mazyr and Navapolatsk with a combined capacity of 40 Mt/yr of petroleum products.

In 1995, the GDP in Belarus reportedly decreased by 10% compared with that of 1994, which was an improvement compared with the 20% decrease in GDP in 1994. Industrial production in 1995 decreased by 11.5% compared with that of 1994 which also was less than 17.1% decrease in 1994.

According to the Belarus Ministry of Statistics and Analysis, production of most mineral commodities reportedly decreased in 1995 compared with 1994 with reported decreases in the production of cement, natural gas, crude petroleum, peat, common salt, and steel. However, production of potash, Belarus' major mineral product, reportedly increased as did the output of petroleum refinery products.

During the 1980's, Belarus had produced about 50% of the potash output of the FSU, producing over 5.5 Mt/yr in the late 1980's. Potash production in Belarus reportedly began decreasing in the 1990's with production falling to 1.9 million metric tons (Mt) in 1993. However, potash production then began reviving and rose to 3.2 Mt in 1995. Based on reporting from January through November 1995, Belarus increased its potash exports in this period compared with 1994, exporting a total of 2,333,000 t of which 286,000 t went to Commonwealth of Independent States (CIS) countries. In 1995 compared with 1994, potash exports to CIS countries increased by 27.8% and to the rest of the world by 18.9%. Potash exports went primarily to Brazil, China, India, Poland, Russia, and the United States.

Exports of potash outside the territory of the FSU had remained at a high level during the 1990's of between 1 Mt/yr and 2 Mt/yr. Belarus had lost most of its former markets in the FSU and East Europe as the agricultural sectors in these countries lacked the ability to pay for potash. Even in Belarus, potash consumption had fallen as the production and consumption of mixed and complex fertilizers declined with Belarus's inability to purchase nitrogen and phosphate raw materials to produce these fertilizers.

In 1995, crude steel production from the minimill at Zhlobin continued to decrease. In 1995, the Zhlobin mill exported about 70% of its output. It increased shipments of steel bars, wire, and rod to western countries including Austria, Germany, Italy, and the United States.

In 1995, Belarus reported extracting 1,932,000 t of crude oil that was a slight decrease from 1994 production of 2,020,000 t. In 1995, natural gas production also decreased to 265 million cubic meters (m^3) compared with 1994 production of 290 million m^3. The drop in oil and gas production was attributed to depletion of reserves and lack of funds for exploration. Belarus had been producing oil since 1964 and in 1995 had 37 operational fields. Much of the country's resources are at great depths and require advanced methods of exploration. According to Belarus' assessments, total undiscovered resources (resource categories C_3,D_1,D_2 based on the Soviet reserve classification system) of oil could exceed 160 Mt and of natural gas roughly 16 billion m^3.

Production of refinery products in 1995 increased by 2.9% compared with 1994 to 13,118,000 t. Belarus, in conjunction with the World Bank, drew up a program to modernize its petroleum- refining industry. The program called for increasing the output of light refinery products at the refinery in Mazyr from 43% of total output to 62% of total output by building a vacuum distillation plant and catalytic cracking unit. The program also calls for constructing a vacuum distillation plant and hydrocracking plant at the refinery in Navapolatsk to increase the production of gasoline, jet fuel, and diesel fuel.

Belarus's refineries ran mainly on oil imported from Russia, with Russia being a major supplier of oil and natural gas and also supplying some petroleum products. In 1995, Belarus imported 11 Mt of oil and 12.4 billion m^3 of natural gas from Russia. Belarus reportedly owed Russia 1.4 billion rubles for oil, almost 2.7 trillion rubles for natural gas, and 10 million rubles for

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petroleum products.

Belarus in 1995 continued to suffer serious environmental problems from the fallout from the Chernobyl nuclear powerplant accident in Ukraine, and was the most severly affected FSU country in percentage of area with about 25% of the area of Belarus affected compared with 10% of Ukraine and less than 1% of Russia. Despite large clean up efforts, in many parts of the affected area there has not been significant improvement. Belarus has had to take numerous measures to alleviate the results of the accident including resettling people, investing in housing and social amenities, removing arable land from agricultural use, treating soil, replacing livestock, etc.

Belarus in 1995 remained dependent on imports, primarily from Russia for the majority of its mineral requirements. For many of these imports, particularly fuels, Belarus has not been able to make timely payments, and has amassed a considerable amount of debt. The future development of Belarus's mineral industry will depend in some measure on political events as Belarus in 1995 moved closer towards integrating its economic structures with Russia. A host of economic, legal, and political issues could arise in this process of closer ties with Russia that could affect mineral production, trade, and investment.

OTHER SOURCES OF INFORMATION

Ministry of Statistics and Analysis
Partizanskiy Prospekt, 12
220658, Minsk
Belarus
Telephone (0172) 49-22-04
Fax (0172) 49-22-04

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TABLE 1
BELARUS: ESTIMATED PRODUCTION OF MINERAL COMMODITIES 1/

(Thousand metric tons unless otherwise specified)

Commodity		1992	1993	1994	1995
Cement		2,300	1,900 2/	1,500 2/	1,200 2/
Nitrogen (N content of ammonia)		700	500	425	500
Peat (fuel use)		400	350 2/	315 2/	4,000
Petroleum:					
Crude		2,000	2,000 2/	2,000 2/	1,930 2/
Refined		20,000	14,200	12,700	13,100 2/
Potash, K2O content 2/		3,300	1,900	3,000	3,200
Salt		360	300	263 2/	219 2/
Steel:					
Crude		1,105	947 2/	880 2/	744 2/
Rolled		770,000	660,000	680,000	586,000 2/
Pipe		80	44 2/	10	12 2/
Natural gas	million cubic meters	300	300	295 2/	266 2/

1/ Table includes data and estimates based on information available through June 9, 1996
2/ Reported figure.

TABLE 2
BELARUS: STRUCTURE OF THE MINERAL INDUSTRY FOR 1995

(Thousand metric tons unless otherwise specified)

Commodity	Major operating company	Location of main facilities	Annual capacity e/
Cement	Volkovysskiy plant	Wawkavysk (Volkovsky)	2,200, total
Do.	Krichevskiy plant	Mogilev region	both plants
Nitrogen, N content of ammonia	Grodno "Azot" Association	Hrodna (Grodno) region	1,000
Peat (fuel use)	Production at 37 enterprises producing mainly briquetes		5,000 1/
Petroleum (crude)	Belarusneft Association	Hrodna region	2,000
Petroleum (refining)	Mozyr refinery	Mazyr (Mozyr)	40,000 2/
Do.	Novopolotsk refinery	Navapolatsk (Novopolotsk)	
Potash (K2O content)	Belaruskaliy Association	Soligorsk area	5,000
Steel (crude)	Belarus electric steelworks	Zhlobin	700

e/ Estimated.
1/ Total peat for fuel use production.
2/ Total for both refineries.

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THE MINERAL INDUSTRY OF

BELGIUM AND LUXEMBOURG

By Harold R. Newman

Belgium

The mineral processing industry was a significant contributor to the Belgian economy. The refining of copper, zinc, and minor metals and the production of steel, all from imported materials, were the largest mineral industries in Belgium. The extraction and recovery of nonferrous metals was carried out in high-technology large-scale plants. Europe's largest electrolytic copper and zinc refineries are in Belgium, as is one of the continent's largest lead refineries. The country was also a significant producer of cadmium, germanium, selenium and tellurium as byproducts from smelting and refining operations. Complex industrial wastes were processed by various sophisticated techniques to recover rare or precious metals.

Although the country is relatively small in size, Belgium has a significant industrial minerals sector. Belgium is an important producer of four groups of industrial materials: carbonates, including limestone, dolomite, and whiting; synthetic materials in the form of soda ash and sodium sulfate; silica sand; and construction materials including a wide range of different types of marble.

Environmental policy in Belgium was the responsibility of the Federal Ministry of the Environment as well as its comparable ministries in the two separate regions of the country, Flanders and Wallonia. Individual companies assumed the responsibility of environmental protection in their own areas of concern and contribute to environmental investment programs. These investments range from treatment of oil effluent to reducing air emissions.

Belgium is a major exporting country and is the ninth largest trading nation in the world. Imports and exports are equivalent to nearly 70% of the country's gross domestic product, making Belgiun one of the highest per capita exporters in the world. It has a long history of reliance on international trade.

Belgium, together with Luxembourg and the Netherlands, forms the BENELUX customs unit. Belgium is also a partner in the Belgium-Luxembourg Union (BLEU) which results in close economic integration between the two countries. International trade data for Belgium were covered in the context of the BLEU, and as such covered the exports, reexports, and imports of Luxembourg. Although detailed trade data have not been available for several years, other members of the European Union (EU) were the most important trading partners accounting for about 81% of exports. Destinations and sources continue to be Germany, (40%), and France (25%), with the Netherlands, the United Kingdom, and Italy, accounting for most of the remainder.

Production of mineral commodities generally remained stable or increased somewhat during 1995. Increases in production generally followed the lines of exported goods, such as value-added nonferrous metals. *(See table 1.)*

Table 2 shows the principal mineral-resource plants in Belgium with their location and capacity. The only mining operations left in Belgium in 1995 were the production of sand and gravel and the quarrying of stone. The metal processing sector of the industry almost exclusively used imported raw materials, whether metal concentrates, scrap, or other materials for smelting and refining or metal for forming and casting.

Table 3 shows the relationship of selected classes of mineral commodities on Belgium-Luxembourg's balance of payments position in relation to the EU and the world.

In 1995, Union Minière SA (UM), traditionally a producer of cobalt special products such as powders and chemicals, started producing refined cobalt as well. Also, UM increased the capacity of its cobalt/nickel refinery to 1,200 t/yr. The company announced plans to further increase capacity to 1,600 t/yr to 1,800 t/yr by 1996. The upgraded facility was equipped to process a variety of materials, from low-grade cobalt metal to a variety of cobalt-bearing scraps and residues.

UM announced plans to modernize its operations by replacing a major part of its copper refinery at Olen with a new facility, probably by 1997. The new plant would have a capacity of 200,000 t/yr, which is lower than the 270,000 t/yr capacity of the existing plant. The company announced that part of the old facility could be maintained to make up for any shortfall in output from the new facility.

UM was also planning to build a new smelter and a new precious metals refinery at its Hoboken plant. These would produce lead, copper, nickel, and precious metals and was expected to be in operation by the end of 1997. Not only will this increase Hoboken's unit capacity and reduce production costs, it will reduce the amount of time that material is in process and reduce environmental problems at Hoboken.

These plans are directed toward making UM the largest zinc producer in Europe and the world's leading refined

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copper, cobalt, and germanium producer.

Cockerill Sambre SA, Belgium's largest steel group, acquired the German steel concern EKO Stahl GmbH, the largest steel plant in what was the former German Democratic Republic (GDR). In the agreement with Treuhandanstalt, the agency responsible for privatizing concerns in the former GDR, Cockerill Sambre acquired 60% of EKO Stahl, effective January 1, 1995, and the successor of the Treuhandanstalt retained 40%. However, Cockerill Sambre was granted the option to acquire the remaining 40% but the German agency could not exercise its right to sell the 40% before December 31, 1999.

The contract for the acquisition of EKO Stahl included the installation of a hot-rolling mill, which had been lacking at the plant, an upgrade of the plant's cold-rolling mill and the installation of a new blast furnace. When the upgrade is completed, planned for 1998, EKO Stahl would be an integrated steel plant. Acquisition of this steel plant not only was expected to give Cockerill Sambre ready access to the important domestic steel market in the eastern states of Germany, but also to that of the nations of eastern Europe, a market expected to expand in the near future.

UM closed its zinc refinery at Overpelt and canceled plans to double the capacity of its zinc refinery at Balen. In addition, UM sold its zinc mines and refinery of the Tennessee-based Union Mines in the United States. These actions followed UM's corporate decision to reduce zinc operations.

Belgium, specifically Antwerp, retained its position in 1995 as the world's leading diamond center with a turnover of diamonds valued at around $19 billion. The diamond industry contributed more than $2 billion to the nation's economy. Belgium's international trade in diamonds for 1993-95 is shown in tables 3 and 4.

Belgium is recognized worldwide for the diversity and quality of its dimension stone. The so-called "petit granit," actually a dark blue-grey crinoidal limestone, is one of the most important facing stones the country produces. The country has been an important producer of marble for more than 2,000 years. All the marble quarries are in the Wallonia regeion. Red, black, and gray are the principal color ranges of the marble, most of which is exported.

When the last coal mines in Belgium closed in 1992, the country became entirely dependent on imported primary energy. Belgium imports all its crude oil for its four petroleum refineries and imports coal to meet the needs of the steel, cement, and power-generating industries. Belgium's seven nuclear powerplants supplied over 60% of its electricity needs. Natural gas has begun to play a more important role as an energy source. Natural gas was more environmentally acceptable as a fuel and Belgium was at the center of the European gas grid.

Belgian National Railways operated 3,568 kilometer (km) of standard gauge track, 2,563 km of double track, and 2,207 km of electrified, all Government-owned. The country had 137,876 km of roadways, of which 129,603 km were paved. The inland waterway system consisted of 2,043 km of which 1,528 were in regular use. The principal ports were Antwerp, Brugge, Ghent, Oostende, and Zeebrugge.

Corporate restructuring and the Government policy of budget cuts, split among the Federal Government and the regional authorities of Flanders and Wallonia were expected to make Belgian products more competitive on the world market. The Belgium export-oriented market relied heavily on the markets of its trading partners, and as profits increase and cash flow increases and improves, it is expected that the economy will continue to experience positive results for the next few years.

Luxembourg

Luxembourg's mineral industry consisted principally of raw materials processing and was dominated by the steel company ARBED S.A., part of the ARBED Group, whose domestic and foreign subsidiaries have interests in steelmaking and steel products, cement, copper foil production, engineering, mining, information systems, and trading, among others.

As a member of the BLEU, trade statistics for Luxembourg are inextricably linked with those of Belgium, and therefore are not able to be listed individually.

ARBED dominates the mineral industry and is involved in producing pig iron from imported iron ore, crude steel, stainless steel, and was involved in other areas of the economy, such as the cement and brickmaking industries. Steel is the Country's main export commodity. Mining in Luxembourg is represented by small industrial mineral operations that produce material for domestic consumption. These minerals include dolomite, limestone, sand and gravel, and slate. *(See table 5.)*

Luxembourg's principal producers of mineral industry products are shown in table 6.

The iron and steel sector remained the most important industrial sector of the economy. Although production remained below that of several years ago, it was not seen as a problem since production can be adjusted to meet demand which has been low in the recent past.

Luxembourg is a landlocked country with 272 km of standard-gauge track, 178 of double track and 197 km of electrified railways operated by the Luxembourg National Railways. The country had 5,108 km of roadways, of which 4,995 km were paved. The only waterway is the Moselle River, of which 37 km in Luxembourg is navigatable, and the only river port was Mertert.

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TABLE 1
BELGIUM: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity 2/		1991	1992	1993	1994	1995 e/
METALS						
Aluminum, secondary including unspecified metals e/		7,390 3/	7,000	4,000	4,000	4,000
Arsenic, white e/		2,500	2,000	2,000	2,000	2,000
Bismuth, metal e/		800	800	950	900	900
Cadmium, primary		1,807	1,550	1,573	1,556	1,700
Cobalt, primary		--	--	--	1,200 e/	1,000
Copper:						
Blister: e/						
Primary		1,000	800	200	2,600	1,000
Secondary		105,000	102,000	141,500	145,000	146,000
Total		106,000	102,800	141,700	147,600	147,000
Unwrought, total of smelter and refined, primary and secondary, including alloys		478,756	471,985	455,235	468,000 e/	465,000
Refined, primary and secondary including alloys		297,593	367,318	378,890	371,152	370,000
Iron and steel:						
Pig iron		9,354,000	8,524,000	8,178,000	9,030,000	9,000,000
Ferroalloys, electric furnace, ferromanganese e/		25,000	25,000	25,000	25,000	25,000
Steel:						
Crude		11,334,883	10,337,352	10,172,616	11,319,234	11,606,000
Hot-rolled products		8,754,645	8,185,659	9,750,000	11,000,000	10,000
Lead:						
Smelter:						
Primary e/ 4/		69,800	75,400	76,000	76,000	75,000
Secondary 5/		21,200	19,700	25,400	25,500 e/	25,000
Total e/		91,000	95,100	101,400	101,500	100,000
Refined:						
Primary		89,484	96,597	105,712	97,200 r/	95,300
Secondary		21,200	19,700	25,400	26,300 r/	26,400
Total		110,684	116,297	131,112	123,500 r/	121,700
Selenium e/		250	250	250	250	250
Tin metal, secondary including alloys e/		4,426 3/	5,260	5,000	5,000	5,000
Zinc:						
Slab:						
Primary		297,600	217,200	209,600	211,200 r/	210,000
Secondary (possibly remelted zinc) e/		87,000	93,400	90,000	95,000	90,000
Total		384,600	310,600	299,600	306,200 r/	300,000
Powder		52,400	43,700	37,700	40,000 e/	36,000
INDUSTRIAL MINERALS						
Barite e/		35,000	30,000	30,000	30,000	30,000
Cement, hydraulic		7,180,000	8,070,000	7,570,000 r/	8,000,000 e/	8,000,000
Clays, kaolin e/		260,000 3/	325,000	300,000	300,000	300,000
Lime and dead-burned dolomite, quicklime		2,020,000	1,870,000	1,750,000 e/	1,750,000 e/	1,800,000
Nitrogen, N content of ammonia		272,000	514,000 r/	535,000 r/	500,000 e/	500,000
Sodium compounds: e/						
Soda ash		380,000	375,000	375,000	-- 3/	--
Sulfate		260,000	250,000	250,000	250,000	250,000
Stone, sand and gravel:						
Calcareous:						
Dolomite		4,030,000	3,980,000	4,000,000	4,000,000 e/	4,000,000
Limestone		34,300,000	33,400,000	33,400,000	33,500,000 e/	33,000,000
Marble:						
In blocks	cubic meters	358	232	250	250 e/	275
Crushed and other e/		80 3/	80	80	80	100
Petit granite (Belgian bluestone):						
Quarried e/	cubic meters	864,000 3/	1,210,000	1,200,000	1,200,000	1,200,000
Sawed e/	do.	67,700 3/	90,000	90,000	90,000	100,000
Worked e/	do.	12,000 3/	15,000	15,000	15,000	15,000
Stone, sand and gravel						
Petit granite (Belgian bluestone)						
Crushed and other e/	cubic meters	599,000 3/	800,000	800,000	800,000	800,000
Porphyry, all types		3,970,000 3/	4,130,000	4,000,000	4,000,000	4,000,000
Quartz and quartzite e/		403,000 3/	500,000	500,000	500,000	500,000

See footnotes at end of table.

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TABLE 1--Continued
BELGIUM: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity 2/		1991	1992	1993	1994	1995 e/
INDUSTRIAL MINERALS--Continued						
Sandstone: e/						
Rough stone including crushed		2,660,000 3/	2,400,000	2,400,000	2,400,000	2,400,000
Paving		14,400 3/	14,000	14,000	14,000	15,000
Sand and gravel: e/						
Construction sand		9,160,000 3/	9,200,000	9,200,000	9,200,000	9,000,000
Foundry sand		489,000 3/	525,000	525,000	525,000	500,000
Dredged sand		2,310,000 3/	2,300,000	2,300,000	2,300,000	2,300,000
Glass sand		2,070,000 3/	1,950,000	1,950,000	1,950,000	1,900,000
Other sand		2,790,000 3/	2,800,000	2,800,000	2,800,000	2,800,000
Gravel, dredged		4,190,000 3/	4,900,000	5,000,000	5,000,000	5,000,000
Sulfur: e/						
Byproduct:						
Elemental		160,000	160,000	160,000	160,000	160,000
Other forms		140,000	140,000	140,000	140,000	140,000
Total		300,000	300,000	300,000	300,000	300,000
Sulfuric acid, oleum		1,940,000	1,910,000	2,000,000	2,000,000	2,000,000
MINERAL FUELS AND RELATED MATERIALS						
Carbon black e/		1,700	1,700	1,700	1,700	1,500
Coal, bituminous		636,000	226,000	--	--	--
Coke, all types		4,887,000	4,510,000	3,895,000 r/ e/	3,673,000	3,600,000
Gas:						
Manufactured	thousand cubic meters	565,000	551,000	550,000 e/	550,000	550,000
Natural (byproduct of coalmining):						
Gross	do.	11,000 e/	7,500	--	--	--
Marketable	do.	6,690	4,000	--	--	--
Petroleum refinery products:						
Liquefied petroleum gas	thousand 42-gallon barrels	5,310	4,330	4,620	5,930	5,500
Aviation gasoline	do.	12	--	--	--	--
Naphtha and white spirit e/	do.	12,200 3/	8,600	9,200	9,200	9,000
Gasoline	do.	50,000	52,400	47,700	48,500	50,000
Jet fuel	do.	12,400	13,700	12,100	13,200	13,000
Kerosene	do.	690	566	597	566	600
Distillate fuel oil	do.	81,900	80,500	79,800	85,100	85,000
Refinery gas e/	do.	3,810 3/	3,500	3,500	3,500	3,500
Residual fuel oil	do.	48,500	44,800	43,900	37,600	38,000
Bitumen e/	do.	5,060 3/	4,000	4,000	4,000	4,000
Other e/	do.	10,000	8,500	8,500	8,500	8,500
Refinery fuel and losses	do.	12,000	12,300	11,700	12,000	12,000
Total e/	do.	37,558,663 r/	37,579,388	36,778,310	36,558,790	36,210,600

e/ Estimated. r/ Revised.

1/ Table includes data available through May 1996.

2/ In addition to the commodities listed, Belgium produced a number of other metals and alloys for which only aggregate output figures were available.

3/ Reported figure.

4/ Data not reported; derived by taking reported total lead output plus exports of lead bullion less imports of lead bullion.

5/ Data represent secondary refined lead output less remelted lead; as such, the figures are probably high because they include some lead that was sufficiently pure as scrap that it did not require resmelting, but data are not adequate to permit differentiation.

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TABLE 2
BELGIUM-LUXEMBOURG: 1994 BALANCE OF PAYMENTS, SELECTED MINERAL COMMODITIES 1/

(Thousand dollars)

Mineral commodity	Exports to EU	Imports from EU	Net gain or (loss)	Exports to the world	Imports from the world	Net gain or (loss)
Crude industrial minerals:						
Diamond, industrial	21,820	20,851	969	57,038	152,525	(95,487)
Stone, dimension	24,110	25,891	(1,781)	26,231	56,997	(30,766)
Other	418,187	478,184	(59,997)	469,375	656,290	(186,915)
Total	464,117	524,926	(60,809)	552,644	865,812	(313,168)
Metalliferous ores:						
Iron ore	2,384	24,056	(21,672)	2,441	395,834	(393,393)
Copper	193	496	(303)	740	5,872	(5,132)
Lead	5,129	4,699	430	5,138	71,119	(65,981)
Zinc	52,046	28,382	23,664	52,104	149,763	(97,659)
Other (including waste and scrap)	331,648	1,070,980	(739,332)	492,940	1,640,250	(1,147,310)
Total	391,400	1,128,613	(737,213)	553,363	2,262,838	(1,709,475)
Nonmetallic mineral manufactures	1,714,331	2,876,060	(1,161,729)	9,790,425	9,221,998	568,427
Metals:						
Iron and steel	6,375,982	3,062,565	3,313,417	8,067,657	3,600,055	4,467,602
Mercury	29	234	(205)	45	275	(230)
Other nonferrous metals	2,743,696	1,629,411	1,114,285	3,453,689	2,687,603	766,086
Total	9,119,707	4,692,210	4,427,497	11,521,391	6,287,933	5,233,458
Mineral fuels	2,920,557	5,889,306	(2,968,749)	4,160,735	8,596,106	(4,435,371)

1/ Table prepared by Glenn J. Wallace, International Data Unit.

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TABLE 3
BELGIUM: STRUCTURE OF THE MINERAL INDUSTRY FOR 1995

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity
Cadmium, metal	tons	Vieille-Montagne NV	Balen-Wezel	1,550
Do.	do.	NV Metallurgie Hoboken-Overpelt SA (NV MHO SA)	Overpelt	600
Cement		Major companies:		8,400
Do.		Cimenteries CBR SA (Societe Generale de Belgique, or SGB)	Plants at Lixhe, Mons/Obourg, Harmignies, Marchienne, Ghent, et al.	3,200
Do.		Ciments d'Obourg SA	Plants at Obourg and Thieu	2,800 1/
Do.		Compagnie des Ciment Belge (Ciments Francais)	Plant at Gaurain-Ramecroix	2,400
Copper		Metallurgie Hoboken-Overpelt SA (Union Minière SA)	Smelter at Antwerp-Hoboken Refinery at Olen	50 330
Do.		Metallo-Chimique NV	Smelter at Beerse	80
Dolomite		Carsambre SA Dolomeuse	Quarry at Floreffe	300
Do.		do.	Quarry at Marche les Dames	600
Do.		do.	Plant at Namur	37
Do.		SA de Marche-les-Dames	Quarries at Vezin and Scalaigneaux and Scalaigneaux	300
Do.		do.	Plant at Vezin	35
Do.		SA des Dolomies de Marche-les-Dames	Quarry at Nameche	300
Do.		do.	Of which--	
Do.		do.	Soft-burned	500
			Dead-burned	200
Do.		SA Dolomies de Villiers-le-Gambon	Quarry at Villiers-le-Gambon	300
Lead, metal		Metallurgie Hoboken-Overpelt SA (Union Minière SA)	Smelter at Antwerp-Hoboken Refinery at Antwerp-Hoboken	90 125
Petroleum, refined	42-gallon barrels per day	Refineries:		602,000
Do.	do.	Fina Raffinaderji Antwerp	Refinery at Antwerp	Of which: (268,000)
Do.	do.	SA Esso NV	do.	(239,000)
Do.	do.	Belgian Refining Corp.	do.	(80,000)
Do.	do.	Nynas Petroleum NV	do.	(125,000)
Steel:		Companies:		14,000
Do.		Cockerill Sambre SA (Government of Wallonia, 80%)	Plants at Liège and Charleroi	Of which: (5,000)
Do.		Sidmar NV (Belgian Government 28.11%; ARBED in Luxembourg, 66.97%)	Plant at Ghent	(3,960)
Do.		Usines Gustave Boël NV	Plant at La Louviere	(2,020)
Do.		Forges de Clabecq SA	Plant at Clabecq	(1,500)
Do.		SA FAbrique de Fer de Charleroi	Plant at Charleroi	(600)
Do.		ALZ NV	Plant at Genk-Zuid	(360)
Do.		New Tubemeuse (NTW) SA	Plant at Flemalle	(300)
Zinc, metal		Vieille-Montagne SA (Union Minière SA)	Smelter at Balen-Wezel	385

1/Includes the capacity of the company SA Ciments de Haccourt.

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TABLE 4
BELGIUM: EXPORTS AND REEXPORTS OF DIAMOND

Destinations	1993		1994		1995	
	Quantity (carats)	Value (thousands)	Quantity (carats)	Value (thousands)	Quantity (carats)	Value (thousands)
Sorted, unworked or simply sawn, cleaved, or bruted:						
Hong Kong	477,509	35,538	1,006,262	46,125	1,822,776	37,003
India	70,000,000	1,600,534	64,068,213	1,577,182	82,547,659	2,249,640
Israel	6,229,748	1,607,974	6,325,339	1,753,183	7,051,162	1,835,839
Malaysia	503,912	64,101	433,042	79,825	415,042	78,298
South Africa, Republic of	19,500	50,355	117,316	71,178	89,718	53,388
Sri Lanka	374,532	96,844	608,774	95,938	1,244,669	211,220
Switzerland	198,640	36,970	272,015	56,414	507,073	144,882
Thailand	121,760	187,035	1,146,364	203,983	1,244,669	211,220
Tunisia	611,370	2,536	26,971	4,417	33,700	5,131
United Kingdom	4,994,308	457,268	4,513,043	528,574	5,003,377	578,951
United States	444,952	305,256	626,142	362,769	533,905	365,429
Unspecified	1,117,488	108,009	1,216,135	145,847	460,771	440,294
Total	85,093,719	4,552,420	80,359,616	4,925,435	100,954,525	5,842,745
Worked but not mounted or set:						
Germany	291,177	206,639	274,662	206,660	312,174	228,281
Hong Kong	628,371	522,620	767,866	608,939	828,602	539,027
Israel	343,104	239,861	400,191	270,355	526,382	342,204
Italy	183,623	92,023	236,920	119,463	311,296	148,354
Japan	442,993	535,531	454,846	610,170	527,585	691,432
Switzerland	369,696	287,190	500,650	397,461	615,554	472,952
Thailand	196,912	118,347	239,842	161,771	281,740	205,528
United Kingdom	223,098	185,254	196,729	226,120	189,034	263,017
United States	1,663,570	1,229,193	1,594,325	1,251,256	1,572,308	1,312,395
Unspecified	797,690	498,111	817,094	541,769	1,029,256	693,277
Total	5,140,234	3,914,769	5,483,125	4,393,964	6,193,931	4,896,467

Source: Diamond International, Nov.-Dec. 1996, No. 44, London, United Kingdom.

TABLE 5
BELGIUM: IMPORTS OF DIAMOND

Sources	1993		1994		1995	
	Quantity (carats)	Value (thousands)	Quantity (carats)	Value (thousands)	Quantity (carats)	Value (thousands)
Natural rough, unsorted, and sorted, unworked or simply sawn, cleaved, or bruted:						
Angola	712,724	135,281	689,443	132,687	562,665	152,948
Australia	7,932,624	53,214	9,245,275	58,016	9,158,490	62,680
Commonwealth of Independent States	1,404,919	48,470	1,201,056	65,253	4,802,359	131,856
Côte d'Ivoire	683,691	101,520	605,078	94,051	1,614,396	121,046
Israel	1,829,278	301,674	1,633,937	339,423	2,667,741	366,300
Liberia	5,006,234	290,143	3,268,982	394,106	10,677,708	757,338
Sierra Leone	344,626	79,637	526,743	107,134	455,062	88,277
Switzerland	1,447,859	153,544	369,134	58,108	635,814	127,618
United Kingdom	38,511,282	2,374,185	19,473,831	2,331,784	28,862,328	2,474,073
United States	1,572,907	138,508	1,279,561	127,275	963,080	103,847
Zaire	18,709,867	701,208	17,047,209	940,806	23,113,137	1,067,263
Unspecified	6,912,948	702,489	8,964,174	783,305	13,351,744	897,770
Total	85,068,959	5,079,873	64,304,423	5,431,948	95,864,524	6,351,016
Worked but not mounted or set:						
Commonwealth of Independent States	389,695	399,963	430,950	429,124	515,759	431,689
Germany	112,761	80,396	130,862	87,061	163,280	125,197
Hong Kong	301,396	178,502	304,382	207,782	276,698	188,375
India	1,754,266	560,059	1,888,913	605,959	2,076,986	724,182
Israel	468,803	463,780	460,859	482,312	458,301	474,617
South Africa, Republic of	109,185	142,333	81,236	120,849	87,648	136,855
Sri Lanka	247,229	113,874	232,328	108,575	240,111	114,283
Switzerland	131,777	165,732	105,704	204,182	193,787	255,256
Thailand	333,893	161,665	395,514	203,806	430,544	231,311
United Kingdom	118,300	132,571	108,101	149,830	103,003	195,419
United States	479,240	384,989	483,997	443,815	579,267	508,253
Unspecified	597,834	431,478	666,320	472,993	758,472	507,621
Total	5,044,379	3,215,342	5,289,166	3,516,288	5,883,856	3,893,058

Source: Diamond International, Nov.-Dec. 1996, No. 44, London, United Kingdom.

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TABLE 6
LUXEMBOURG: PRODUCTION OF MINERAL COMMODITIES 1/ 2/

(Metric tons unless otherwise specified)

Commodity	1991	1992	1993	1994	1995 e/
Cement, hydraulic e/	687,786 3/	600,000 r/	620,000 r/	620,000	600,000
Gypsum and anhydrite, crude e/	400	400	400	400	400
Iron and steel, metal: Pig iron	2,463,000	2,256,000	2,411,000	1,927,000	2,000,000
Steel:					
Crude	3,379,440	3,068,463	3,293,000	3,092,000	2,613,000
Semimanufactures	3,787,000	3,590,000	3,650,000	3,620,000	3,650,000
Phosphates: Thomas slag:					
Gross weight	535,518	519,000	555,000 e/	472,000 e/	500,000
P_2O_5 content e/	95,000	93,000	100,000	75,000	75,000

e/ Estimated. r/ Revised.
1/ Table includes data available through May 1996.
2/ Construction materials such as dimension stone and sand and gravel are also produced, but the amounts are no longer reported and no basis exists for the formulation of reliable estimates of output levels.
3/ Reported figure.

TABLE 7
LUXEMBOURG: STRUCTURE OF THE MINERAL INDUSTRY FOR 1995

(Thousand metric tons)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity
Cement	SA des Ciments Luxembourgeois (ARBED, 50%; SGB, 25%)	Plant at Esch-sur-Alzette	450
Do.	Intermoselle SARL (ARBED, 33%)	Plant at Rumelange	1000
Steel	Acieries Reunies de Burbach-Eich-Dudelang (ARBED) (SGB, 25%; Belgian Government, 31%; and others)	Plants at Differdange, Dudelange, Esch-Belval, and Esch-Schifflange	5320

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THE MINERAL INDUSTRY OF

BOSNIA AND HERZEGOVINA

By Walter G. Steblez

In 1995, Bosnia and Herzegovina continued to be under extreme duress from the ongoing civil war. Before the outbreak of the civil war, the country was a major producer of minerals and heavy industrial products in the former Yugoslavia. However, the operational status of many of these industries in 1995 remained uncertain because of the fighting that reportedly occurred in close proximity to these facilities. In addition, the damage incurred by the country's industry and infrastructure had been severe. According to information supplied by sources in Serbia and Montenegro, the Serbian-controlled areas of Bosnia and Herzegovina (about 70% of the country's total territory), known as the "Srpska Republic," controlled substantial proportions of Bosnia and Herzegovina's mineral resources. According to the Bosnian-Serb Chamber of Commerce, the share of mineral resources within Serbian-dominated areas of Bosnia and Herzegovina were as follows: bauxite, 12%; brown coal, 37%; gypsum, 88%; iron ore, 68%; lead and zinc ore, 35%; lignite, 12%; and quartz, 89%.[1]

The statistical base for the production table for Bosnia and Herzegovina was obtained from data presented in a variety of statistical publications of the former Yugoslavia through 1991. The major portion of the base for the country's production statistics was "Industrijska Proizvodnja," an annual statistical compendium published in Belgrade through 1990 that presented production data by constituent Federal Republics, as well as by total output for the former Yugoslavia. Statistical information on the country's mineral production for 1992-95 was not available because of the war. Presumably, when and where possible, the Government provided assistance to industries, including those in the minerals sector, that could help maintain employment and assist in the country's defense. Estimates were based on known capacities and available press reports concerning the status of industrial operations in the country. *(See table 1.)* Moreover, detailed official information concerning foreign trade for 1994-95 also was unavailable. Table 2, which lists the apparent administrative bodies as well as subordinate production units of the main branches of the country's mineral industry for 1994, was based on known industrial capacities prior to the outbreak of the civil war. *(See table 2.)*

Before the dissolution of the Socialist Federal Republic of Yugoslavia and the subsequent civil war, Bosnia and Herzegovina was a major center for metallurgical industries in the former Yugoslavia. The country's total output of steel had ranged between 38% and 39% of total steel production for Yugoslavia. The Rudarsko Metalurški Kombinat plant at Zenica, with a combined production capacity in excess of 2 Mt/yr, in 1990, accounted for 53% of the former Yugoslavia's output of steel produced in oxygen converters and 62% produced by the open-hearth method.

Bosnia and Herzegovina also was a major producer of bauxite, alumina, and aluminum in the former Yugoslavia, respectively accounting for about 58%, 68%, and 26% of total output of these commodities in 1990. Production of bauxite, alumina, and aluminum was administered by Energoinvest. Bauxite was produced at mines in Vlasenica, Jajce, and Bosanksa Krupa among others. Alumina refineries were operated at Birac-Zvornik and Mostar; the aluminum smelter also was at Mostar, the center of the aluminum fabricating and aircraft industries in the former Yugoslavia. The production of other nonferrous metals included only a relatively small amount of lead and zinc ore mined and milled at Srebrenica, the focal point of major battles during the year. Bosnia and Herzegovina was a major producer of asbestos, barite, gypsum, and salt, accounting respectively for about 81%, 92%, 63%, and 100% of the total output of these commodities in the former Yugoslavia in 1990. The country also produced cement, clays, dimension stone, dolomite, sand and gravel, as well as other industrial minerals that met
most of its industrial needs.

Bosnia and Herzegovina's SOUR Titovi Rudnici Uglja Tuzla, the country's dominant coal producer, mined brown coal and lignite that were consumed primarily by the country's thermal electric power stations. Bosnia and Herzegovina's refineries, operated by Energoinvest at Bosanski Brod, were entirely dependent on deliveries of natural gas and petroleum from outside the country. Reportedly, the Bosanski Brod refineries were extensively damaged in April 1993 during local fighting. Petroleum pipelines were 174 km in length; however, data for natural gas pipelines were not available.

The eventual transformation of Bosnia and Herzegovina's

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economy to a market-based system will require a reevaluation of the country's mineral resources from a market perspective. For a detailed explanation of the system that was used to determine reserves in the former Yugoslavia, see the reserve section in "The Mineral Industry of Russia" report in this publication series.

Most of Bosnia and Herzegovina's heavy industrial facilities, including those in the minerals sector, reportedly had been heavily damaged during the year. Although the extent of the damage was not clear, general information released from the areas of conflict showed significant destruction of the country's infrastructure and massive dislocations of regional populations. The process of reconstruction that should follow the resolution of the country's conflicts should be extensive and would call for maximum use of the country's domestic sources of metals, industrial minerals, and fuels.

[1] Foreign Broadcast Information Service (FBIS). EEU-94-071, Apr. 13, 1994, p. 40; from Politika (Belgrade) Mar. 15, 1994, p. 14.

TABLE 1
BOSNIA AND HERZEGOVINA: PRODUCTION OF MINERAL COMMODITIES e/ 1/

(Metric tons unless otherwise specified)

Commodity	1991	1992	1993	1994	1995
METALS					
Aluminum :					
Bauxite	900,000	200,000	100,000	75,000	75,000
Alumina	500,000	100,000	50,000	50,000	50,000
Metal, ingot; primary and secondary	84,000	30,000	15,000	15,000	15,000
Iron and steel :					
Ore and concentrate:					
Ore, gross weight	2,500,000	500,000	250,000	200,000	150,000
Ore, Fe content	800,000	150,000	70,000	70,000	52,000
Agglomerate	1,000,000	200,000	50,000	50,000	50,000
Metal:					
Ferroalloys:					
Ferrosilicon	17,000	5,000	1,000	1,000	1,000
Silicon	7,000	2,000	200	200	200
Pig iron	1,000,000	150,000	100,000	100,000	100,000
Steel, crude:					
From oxygen converters	600,000	100,000	90,000	90,000	90,000
From Siemens-Martin furnaces	150,000	30,000	20,000	20,000	20,000
From electric furnaces	18,000	5,000	5,000	5,000	5,000
Total	768,000	135,000	115,000	115,000	115,000
Semimanufactures	800,000	200,000	150,000	100,000	100,000
Lead :					
Mine andl concentrator output:					
Ore, gross weight (Pb Zn ore)	300,000	50,000	10,000	10,000	10,000
Pb content of ores	5,000	800	200	200	200
Pb concentrate	7,000	2,000	400	400	400
Metal, smelter, primary and secondary	400	250	100	100	100
Manganese ore :					
Gross weight	40,000	10,000	2,000	2,000	2,000
Mn content	14,000	3,500	600	600	600
Zinc :					
Zinc content of Pb-Zn ore	10,000	2,000	350	300	300
Concentrate output, gross weight	13,000	3,000	600	600	600
INDUSTRIAL MINERALS					
Asbestos, all kinds	4,400	500	500	500	5,000
Barite concentrate	17,000	3,000	2,000	2,000	2,000
Cement thousand tons	750	150	150	150	150
Clays:					
Bentonite	6,000	1,000	800	800	800
Ceramic clay, crude	100,000	20,000	20,000	20,000	20,000

See footnotes at end of table.

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TABLE 1--Continued

BOSNIA AND HERCEGOVINA: ESTIMATED PRODUCTION OF MINERAL COMMODITIES e/ 1/

(Metric tons unless otherwise specified)

Commodity		1991	1992	1993	1994	1995
INDUSTRIAL MINERALS--Continued						
Clays--Continued:						
Kaolin :						
Crude		19,000	3,000	3,000	3,000	3,000
Processed		10,000	1,500	1,500	1,500	1,500
Gypsum :						
Crude		230,000	50,000	30,000	30,000	30,000
Calcined		21,000	4,000	3,000	3,000	3,000
Lime	thousand tons	350	50	50	50	50
Magnesite, crude		10,000	2,000	2,000	2,000	2,000
Nitrogen: N content of ammonia		20,000	5,000	2,000	2,000	2,000
Quartz, quartzite, glass sand :						
Glass sand		400,000	50,000	50,000	50,000	50,000
Salt, all sources		300,000	70,000	50,000	50,000	50,000
Sand and gravel, excluding glass sand	thousand cubic meters	2,500	500	500	500	500
Sodium compounds :						
Soda ash		140,000	25,000	20,000	20,000	10,000
Caustic soda		70,000	20,000	10,000	10,000	10,000
Sodium bicarbonate		10,000	2,000	1,000	1,000	1,000
Stone, excluding quartz and quartzite :						
Dimension, Crude :						
Ornamental	square meters	250,000	50,000	20,000	20,000	20,000
Other	cubic meters	15,000	5,000	2,000	2,000	2,000
Crushed and brown, n.e.s.	thousand cubic meters	3,000	500	500	500	500
Sulfur: Byproduct of metallurgy		8	2	1	1	1
MINERAL FUELS AND RELATED MATERIALS						
Coal :						
Brown coal	thousand tons	9,500	2,500	1,000	1,000	1,000
Lignite	do.	8,000	2,000	1,500	1,500	1,500
Coke		850	150	100	100	100
Refinery products	thousand barrels	18,000	2,000	--	--	--

e/ Estimated

1/ In addition to commodities listed, common clay was also produced, but available information is inadequate to make reliable estimates of output levels.

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TABLE 2
BOSNIA AND HERZEGOVINA: STRUCTURE OF THE MINERAL INDUSTRY FOR 1995

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies	Location of main facilities	Annual capacity
Alumina		Energoinvest	Plants at Birac-Zvornik	600
Do.		do.	Plant at Mostar	280
Aluminum		do.	Smelter at Mostar	92
Bauxite		do.	Mines at Vlasenica, Jajce, Bosanska Krupa, Posusje, Listica, Citluk, and other locations.	2,000
Coal:				
Brown		SOUR Titovi Rudnici Uglja, Tuzla	Mines in BiH	12,000
Lignite		do.	do.	7,000
Cement		Gik Hidrogradnja, Tvornica Cementa BiH	Plant at Kakanj	650
Ferroalloys		Elktrobosna, Elektrohemijska i Eletrotermijska Industrija	Plant at Jajce	80
Iron ore		Rudarsko Metalurski Kombinat Zenica	Mines at Vares, Ljubija, and Radovan	5,000
Lead-zinc ore		Energoinvest	Mine and mill at Srebrenica	300
Manganese, ore		Mangan-Energoinvest	Mine and concentrator at Buzim	100
Petroleum, refined	thousand barrels per day	Energoinvest: Rafinerija Nafte Bosanski Brod	Refinery at Bosanski Brod	100
Pig iron		Rudarsko metalurski Kombinat Zenica (RMK Zenica)	4 blast furnaces at Zenica	2,250
			2 blast furnaces at Vares	100
Do.		do.	Electric reduction furnaces at Iljas	100
Salt	cubic meters per year	Hemijski Kombinat "Sodaso," Rudnik Soli i Solni Bunari	Rock salt: Mines at Tusanj	120,000
Do.	do.	do.	Production from brine at Tuzla, BiH	2,000,000
Steel, crude		Rudarsko Metalurski Kombinat Zenica	Plant at Zenica	2,060

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THE MINERAL INDUSTRY OF

BULGARIA

By Walter G. Steblez

In 1995, Bulgaria remained a regional producer of nonferrous metal ores and concentrates that met most of its domestic needs. Relatively small quantities of iron and manganese ores and a variety of industrial minerals that included asbestos, barite, fluorspar, gypsum, and limestone were also mined, largely for domestic consumption. However, most of the country's requirements for iron ore, steel, and mineral fuels had to be met through imports.

Reportedly, the country's economy in 1995 showed some recovery with the gross domestic product and industrial production growing slightly. The transition of Bulgaria's economy to a market-based system from 1990-95 was accompanied by a declining trend in industrial production, including the production of most mineral commodities. Generally, the decline in the country's output of minerals and other industrial products has been wholly consistent with structural adjustment needed by the economy to dismantle the former system of central economic planning. Additionally, the dissolution of a guaranteed Council of CMEA-based barter trading network, and, in a number of cases, environmental considerations also added constraints on industrial production. In 1995, the Government of Bulgaria continued to implement social and market economic reforms that began in 1989. Issues pertaining to decentralization and denationalization of the economy, as well as the need to redress decades-long problems associated with industry-generated environmental pollution, were among those that continued to be important elements in the Government's domestic agenda for 1995. The process of privatization mainly was carried out under the provisions of two laws: (1) "Bulgarian Law No. 215, 1991 on Conversion of State Enterprises" relating to private trade associations holding and/or using state property and its conversion to full commercial companies; and (2) "Bulgarian Law on Transformation and Privatization of State-Owned and Municipal Enterprises of 3/92" pertaining to the establishment of a legally designated privatization agency, the evaluation and transformation of state-owned enterprises, the sale of shares and stocks owned by the state and municipalities, and the sale of total assets or discreet parts of state-owned enterprises.[1] These laws also would have direct bearing on the process of denationalization of the country's minerals industry enterprises.

Environmental pollution survey data for Bulgaria, compiled by the International Bank for Reconstruction and Development in 1994, provided environmental status reports for the cement, iron and steel, nonferrous metals, and petrochemical sectors of the country's minerals industries. According to the study, the principal pollutants generated by the cement industry were particulates and gases, such as sulfur dioxide (SO_2), nitrous oxide (NO_x), and carbon monoxide.[2] The decline in pollution generated from 1991 to 1993 largely was the result of the decline of production (about 50% compared with 1990 output) during this period.

In the iron and steel sector, the principal pollutants were ammonia, hydrogen sulfide, lead aerosols from the use of iron ores, NO_x, particulates, and phenols associated with coke ovens, milling operations, and local electric power generation. Bulgaria's steel mills at Kremikovtsi and Pernik used domestic iron ores, which have a high lead and manganese content, in addition to the mainly imported ores and concentrates used in these facilities. The technology utilized at both steel mills reportedly was out of date and any modernization would abate the level of atmospheric pollutants emitted. Some modernization and repair and maintenance were reported in 1992-93, including monitoring equipment and new electrostatic precipitators. However, since 1990, the primary delimiting factor to increased levels of pollution has been the Government's limitation on the use of domestic iron ore to 10% to 20% of total charge used. Major point sources of pollution were associated with the country's nonferrous mining, processing, and smelting operations. The major pollutants in this industry have been SO_2 and particulates composed mainly of heavy metals. Since 1991, modernization projects that had been completed reportedly included the installation of newer and more efficient combustion units at the Plovdiv lead smelter. However, the level of investment needed by the Kurdjali zinc and Plovdiv lead smelters for actual pollution control equipment reportedly would amount to about US$300 million. Bulgaria's petrochemical industry also was a major source of air and water contamination. In addition to particulates and SO_2 and NO_x gases generated by the industry's powerplants, pollutants associated with petrochemical processing included hydrogen sulfide, hydrocarbons, and sludge. With the exception of the Pleven petrochemical plant, little or no pollution control equipment was reported to have

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been installed at the major facilities in this sector since 1991.

Some factors that contributed to the largely negative trend in the country's output of mineral commodities from 1989 to 1994 remained in effect in 1995; namely, a structural reformation of Bulgaria's economy from a centrally planned to a market-based system and the adjustment of Bulgaria's foreign trade towards the world market. Although the steep decline of production of most mineral commodities (1989-91) appeared to have somewhat abated during 1993-95, some uncertainty still remained about the future viability of the country's minerals industries. The tension between the social cost associated with widespread and hazardous environmental pollution and that associated with widespread and extended unemployment that would arise from a rapid large-scale closure of mineral industry facilities has yet to be resolved. Bulgaria continued to experience serious shortages of capital needed for both pollution containment and facility modernization to increase efficiency and competitiveness. (*See table 1.*) Table 2 lists the administrative bodies as well as subordinate production units of the main branches of the country's mineral industry in 1995. *(See table 2.)*

Until 1989, the largest share of Bulgaria's foreign trade was conducted within the CMEA barter-based trading system. Since 1989, Bulgaria's foreign trade was expanded to include Western Europe and other regional markets. However, with respect to mineral trade, former CMEA countries, especially the former Republics of the Soviet Union (FSU), remained Bulgaria's principal sources of mineral raw materials and mineral fuels. Ferroalloys, steel, and metal ores and concentrates were important mineral commodities that Bulgaria continued to trade with former centrally planned economy countries of Europe, but regular imports of natural gas and petroleum from Russia and other Republics of FSU remained critical to Bulgaria's economy.

Bulgaria's mineral industry produced copper from ores mined at the Asarel-Medet, Burgas, and Elatzite mining complexes. Recently, the Chelopech mining and processing operation was closed for environmental reasons stemming from hazardous levels of arsenic in the ore. About 95.7% of the country's copper ore was mined in open pit mines and 4.3% in underground mines. Underground copper mining was done by sublevel stoping (64%), cut-and-fill stoping (22%), and longwall stoping (12%).[3] In 1994, in what had been described as a breakthrough of a Bulgarian producer in the western European credit market, Handelsbank of Vienna reportedly extended a US$24 million loan to Asarel-Medet Inc.'s copper ore mining and processing complex at Panagyurishte. The funds were to be used to modernize both the mining and beneficiation technology and equipment. Asarel-Medet's finished products were to be the basis for paying off the debt owed to Handelsbank.[4] In late 1995, the Government reported that investment priority would be given for the construction of a new electrolytic copper production line at the Pirdop mining, beneficiation, smelting and refining complex. The new facility would cost about US$100 million, for which the funding would be obtained from loans from Japan's Overseas Economic Cooperation Fund.[5] In 1995, Gorubso, one of Bulgaria's major producers of lead and zinc, announced plans to produce a copper concentrate from run of mine lead and zinc ore. The concentrate would be destined for domestic refineries and for export.[6] As part of the modernization of its beneficiation plant, Elatzite-Med Ltd. announced the awarding of a contract to supply eight crushers and six heavy screens, valued at about US$9.8 million, to Krupp Fordertechnik GmbH of Germany. Krupp's Kubria cone crushers were to replace 10 older Soviet-built units and the beneficiation plant was to have become operational in September 1995.

In mid-1995, the Homestake Mining Co. of California concluded an agreement with Navan Resources Plc of Ireland to acquire an approximately 10.3% stake in Bulgaria's Chelopech gold-copper mine. Reportedly, Homestake Mining was to pay US$24 million for 6 million newly issued shares of Navan Resources that would give it the stake in the Chelopech operation.[7] Navan's original involvement with Chelopech began in 1992 when it acquired a 25% interest in the enterprise, having demonstrated to the Government of Bulgaria the feasibility of commercially treating arseniferous concentrates without adversely affecting the environment. In 1993, Navan Resources concluded additional agreements with Bulgaria's state-owned Chelopech Ltd. which gave Navan Resources a 40% equity stake in the joint venture in return for Navan's investment to provide a bacterial-leaching plant and later a 68% interest in exchange for further investment in the enterprise. Resources at the Chelopech deposit were determined to be about 62 Mt of ore grading 0.98% copper, 2.48 grams per metric ton (g/t) gold, and 6.72 g/t of silver.[8] Reportedly, the resources that were considered for exploitation in the near term amounted to 32.5 Mt of ore grading 5.0 g/t of gold and about 1.4% copper at a 5.0 g/t equivalent cutoff.[9] By late 1994, Navan Resources had made the required investments in Chelopech to allow the commencement of tailings retreatment. It was planned to produce 5,000 tons of concentrates containing 18% copper and 45 g/t of gold. Reportedly, the tailings resources were determined to be sufficient to supplement the underground mining output for about 2 years.[10] Production at Chelopech in 1995 was anticipated to yield about 1.87 million grams of gold (about 60,000 troy ounces) and 5.4 t of copper.[11]

In May 1995, Bulgaria reported the discovery of large

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and commercially important gold deposits in southern Bulgaria at Ivailovgrad near the villages of Spahievo and Sedefche.[12] According to early reports, the deposits in this area were determined to be 150 to 200 meters (m) deep, consisting of two quartz veins. One vein was reported to be 300 m in length, 3 m wide, and 2 m thick, with five branches. The second gold-bearing vein, found below the one described above, measured 65 m in width on the surface but was of yet undetermined thickness and depth. The Bulgarian-Australian Gold Co., a joint-venture consortium of Bulgarian and Australian mining interests, reportedly submitted a request to the Government of Bulgaria to add the Spahoevo-Sedefche deposits to its principal gold mining concession at Madjarovo in the Haskovo region. The Bulgarian-Australian Gold Co. announced plans to invest about US$11 million in the region during 1995-97, which would save and restore jobs at the nearby Gorubso lead and zinc mining and processing operations. These investments were to have included gold refining facilities to process the local ore.[13]

From an environmental standpoint, Bulgaria's lead and zinc industry continued to have difficulties. Limitations on output from certain operations at mining and beneficiation complexes were expected to continue until the environmental damage was rectified. Although the country's lead and zinc smelting and refining operations reportedly operated at production levels comparable with those in 1995, most of the output was exported to Europe, the Middle East, India, and Pakistan. Domestic demand for lead and zinc had been low. In 1995, the Kurdjali Lead and Zinc Works only sold 600 t of zinc to domestic consumers out of its production for the year of 27,600 tons.[14]

The Kremikovtsi Iron & Steel Works, the country's largest steel producer, reported continuing modernization of its operations. Bulgaria's Economic Bank approved a loan of US$34 million from the State Fund for Reconstruction and Development to finance the construction of a continuous casting unit and the installation of Kremikovtsi's sixth oxygen converter. The continuous casting equipment was to be provided by Voest Alpine of Austria. With the completion of modernization at Kremikovtsi, the production of steel was expected to conform to western European standards.[15]

A variety of industrial minerals that included bentonite, dolomite, fluorite, gypsum, kaolin, marble, and perlite, largely for domestic consumption, were produced in Bulgaria. Industrial minerals were expected to obtain a greater prominence in the country's economy owing to the eventual needs of the construction materials and chemical sectors to meet the country's requirements for a modern infrastructure. At yearend, according to official Government press releases, a number of cement plants were offered for privatization to domestic and foreign investors. Modernization of the cement industry during recent years reportedly was mimimal. Equipment, such as electrostatic precipitators and bag filters, was installed during the mid-1970's to the mid-1980's and was in need of replacement. Economic dislocations during the transitional period from 1990 to 1995 also reduced maintenance and delivery of needed spare parts to the mills. However, some improvements were made with the application of modern technology in one cement plant and the switch from coal to gas at a number of other facilities.

Reportedly the value of production Bulgaria's chemical industry increased by about 20% in 1995, compared with that of 1994. This was especially true of the country's producer of soda ash, Sodi Ltd. of Devnja, which reported an income of US$60 million in the first 8 months of 1995, compared with US$24 million for the entire 1994 period. Major consumers were in Europe and the Far East. Exports during the first 8 months of 1995 amounted to about 360,000 tons.

In 1994, Bulgaria reported the closure of its uranium mines because of high operational costs as well as environmental concerns. The remaining uranium concentrate (640 t) that had been produced from domestic mining operations had been stockpiled for possible future use. Reportedly, from 1946 to 1989, Bulgaria's annual production of uranium ranged from
100 t to 600 t of concentrate. During that period, the country's ore was processed in the FSU. Until recently, information concerning the country's nuclear materials industry was considered classified and was not published. Owing to the environmental hazards associated with the continued storage of this material, and the lack of domestic technology needed to process the concentrate into fuel, the Government of Bulgaria decided to sell the stockpiled uranium concentrate at world market prices. However, by yearend 1995, no sales were made from the stockpiled uranium concentrate and, following protests by miners and other workers in this industry, the Government reconsidered the total closure of an industry that consisted of 51 mining operations.[16] Reportedly, a report prepared for the Government of Bulgaria proposed the preservation of 10 uranium mining operations that were determined to be economic and could provide up to 25% of the country's needs for nuclear fuel. An extension of liquidation terms for operations scheduled for closure also was proposed.

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[1] NTIS, Legal Text Service. Central and Eastern Europe and Russia and Independent States. Winter/Spring 1994.

[2] World Bank, Bulgaria: Environmental Strategy Study Update and Follow-Up. Report No. 13493-BUD, Washington DC, December 1994, pp. 64-74.

[3] Georgiev, K. Mining Industry of Bulgaria. Oruktos Ploutos (Athens), 85/1993, pp. 44-51.

[4] FBIS-EEU-94-164-S, Aug. 24, 1994 p. 6; from BTA 0954 GMT, Aug. 10, 1994.

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[5] Mining Journal (London) Jan., 12, 1996, p. 25.
[6] ___. Aug. 11, 1995, p. 98.
[7] American Metal Market, v. 103 No. 120, June 22, 1995,p. 16.
[8] SWB EE/W0292. July 29, 1993, p. A/7, from "Standard News" July 20, 1993.
[9] Mining Magazine, Nov. 1994, p. 242.
[10] Mining Journal, Oct. 21, 1994, p. 291.
[11] SWB EE/W0292, July 29, 1993, p. A/7, from "Standard News" July 20, 1993.
[12] FBIS-EEU-95-098-S, May 20, 1995, p. 4; from BTA (Sofia) 1756 GMT May 2, 1995, and Mining Journal (London), June 30, 1995, p. 481.
[13] Mining Journal, Sept. 22, 1995, p. 214.
[14] Mining Journal (London), Sept. 22, 1995, p. 214.
[15] FBIS-EEU-95-242-S, Dec. 18, 1995, p. 4; from DUMA Dec. 2, 1995, p. 5.
[16] FBIS-EEU-95-185-S, Sept. 25, 1995, p. 5; from BTA, 1009 GMT, Sept. 12, 1995.

TABLE 1
BULGARIA: PRODUCTION OF MINERAL COMMODITIES 1/ 2/

(Metric tons unless otherwise specified)

Commodity		1991	1992	1993	1994	1995 e/
METALS						
Aluminum metal, secondary		2,052 r/	2,688 r/	1,832 r/	955	1,000
Bismuth metal e/		40	40	40	40	40
Cadmium metal, smelter		232	200	265	286	250
Copper:						
Ore:						
Gross weight	thousand tons	15,500 e/	16,000 e/	19,700	19,000	19,000
Cu content	do.	65	67	93	75	75
Concentrate:						
Gross weight	do.	360	270	250	250	250
Cu content	do.	46	35	33	33	33
Metal, primary and secondary:						
Smelter		27,800	25,000	28,000	40,000	40,000
Refined		12,800	18,000	26,300	26,500	27,000
Gold metal e/	kilograms	2,000	2,000	2,000	2,000	2,000
Iron and steel						
Iron ore:						
Gross weight e/	thousand tons	700	900	1,000	950	1,000
Fe content	do.	182	239	266	250	250
Iron concentrates	do.	270	351	428	400	400
Metal:						
Pig iron for steelmaking	do.	943	837	998	1,442 r/	1,300
Ferroalloys, ferrosilicon e/	do.	28	20	20	20	20
Steel, crude	do.	1,615 r/	1,551 r/	1,941 r/	2,491 r/	2,400
Semimanufactures, rolled	do.	1,309 r/	1,555 r/	2,046 r/	2,050	2,000
Lead:						
Mine output, Pb content		50,000	45,000	40,000	50,000	50,000
Concentrate: e/						
Gross weight		62,300	60,000	60,000	65,000	65,000
Pb content		43,600	39,000	39,000	43,000	43,000
Metal, refined, primary and secondary		56,223 r/	53,099 r/	56,994 r/	62,300	63,000
Manganese ore:						
Gross weight		34,000	25,500	15,500	11,500	11,500
Mn content		8,700	6,900	4,000	3,000	3,000
Molybdenum, mine output, Mo content e/		120	120	120	120	110
Silver, mine output, Ag content e/		37	35	35	35	35
Tin, metal		22	23	23	22	22
Uranium, oxide, U content e/		700	600	600	600	600
Zinc:						
Mine output, Zn content		29,100	29,000	32,000	30,000	30,000
Concentrate: e/						
Gross weight		70,000	70,000	65,000	75,000	75,000
Zn content		31,000	31,000	30,000	33,000	33,000
Metal, smelter, primary and secondary		58,730 r/	57,820 r/	54,039 r/	64,000	65,000
INDUSTRIAL MINERALS						
Asbestos		400	500	500	500	500
Cement, hydraulic	thousand tons	2,374 r/	2,132 r/	2,007 r/	2,200	2,100

See footnotes at end of table.

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TABLE 1--Continued
BULGARIA: PRODUCTION OF MINERAL COMMODITIES 1/ 2/

(Metric tons unless otherwise specified)

Commodity		1991	1992	1993	1994	1995 e/
INDUSTRIAL MINERALS--Continued						
Clays:						
Bentonite	thousand tons	114	80 e/	67	70	70
Kaolin	do.	106	104	111	115	115
Feldspar	do.	46	48 e/	51	50	50
Gypsum and anhydrite:						
Crude	do.	63	125	143	150	150
Calcined	do.	41	57	54	60	60
Lime: Industrial	do.	1,030	729	531	500	500
Nitrogen: N content of ammonia	do.	1,092 r/	905	885	900	900
Pyrites, gross weight e/	do.	170	170	150	150	150
Salt, all types	do.	1,970	1,000	650	700	700
Sodium carbonate, calcined	do.	893	517	259	300	300
Sulfur: e/						
S content of pyrites		60,000	60,000	50,000	50,000	50,000
Byproduct, all sources		50,000	50,000	50,000	50,000	50,000
Total		110,000	110,000	100,000	100,000	100,000
MINERAL FUELS AND RELATED MATERIALS						
Coal, marketable:						
Anthracite	thousand tons	42	45	41	40	40
Bituminous	do.	86	203	222	200	200
Brown	do.	3,090	3,350	3,420	3,400	3,400
Lignite	do.	25,200	26,700	25,400	26,200	26,200
Total	do.	28,418 r/	30,298 r/	29,083 r/	29,840 r/	29,840
Coke	do.	738	840	912	969	950
Gas, natural, marketed	million cubic meters	10	8	7	8	8
Petroleum:						
Crude, As reported	thousand tons	58	53	43	45	45
Refinery products e/	thousand 42-gallon barrels	20,000	20,000	20,000	25,000	25,000

e/ Estimated. r/ Revised.

1/ Table includes data available through Apr. 1996.

2/ In addition to the commodities listed, barite, chromite, fluorspar, magnesite, palladium, platinum, tellurium, uranium, and a variety of crude construction materials (common clays, sand and gravel, dimension stone, and crushed stone) are produced, but available information is inadequate to make reliable estimates of output levels.

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TABLE 2
BULGARIA: STRUCTURE OF THE MINERAL INDUSTRY FOR 1995

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies	Location of main facilities	Annual capacity
Cement	Reka Devnia	Devnia	1,825.
Do.	Zlatna Panega	Panega	1,300.
Do.	Others	Temelkovo, Dimitrovgrad, Pleven, and Beli Izvor	1,590.
Coal:			
Bitiminous	Economic Mining and Power Combine (Smek) Balkanbass	Balkan Coal Basin in central Bulgaria, northwest of Silven	445.
Brown	G. Dimitrov	Pernik coal basin, southwest of Sofia	4,000.
Do.	Others	Bobov Dol and Pirin in western Bulgaria	3,100.
Lignite	SMEK East Maritsa	East Maritsa coal basin near Zagora	25,000.
Do.	Others	Marbas. Pernik, and Bobov Dol coal basins	5,300.
Copper (Cu):			
Concentrate, Cu content	Medet-Asarel Co.	Panagurishte, Pazardzhik District	25.
Do.	Chelopech Ltd.	Srednogorie, Sofia District	5.
Do.	Bradtze	Malko Turnovo	2.
Do.	Elatzite-Med Ltd.	Srednogorie, Sofia District	15.
Do.	Rosen	Burgas, near the Black Sea	1.
Do.	Tsar Asen	Srednogorie, Sofia District	2.
Do.	Burgaskii Mines Ltd., Zidorovo	Burgas, near the Black Sea	0.5
Metal, refined	Georgi Damyanov	Srednogorie, Sofia District	120.
Iron ore	Kremikovtsi Iron and Steel Combine	Kremikovtsi	2,000.
Lead-zinc (Pb-Zn):			
Concentrate, Pb-Zn content	Gorubso Co.	Erma Reka, Kurdjali, Laki, and Rudozem, in Madan area near Greek border	59 Pb, 47 Zn.
Do.	Madzharovo Ltd.	Near Plovdiv	3 Pb, 2 Zn.
Do.	Ossogovo Ltd.	Ossogovo Mountains, western Bulgaria	3 Pb, 2 Zn.
Do.	Ustrem Ltd.	Near Thundza River, eastern Bulgaria	3.5 Pb, 0.8 Zn.
Metal:			
Pb, refined	Dimitur Blagoev	Plovdiv	65.
Do.	Georgi Dimitrov	Kurdjali	60.
Zn, smelter	Dimitur Blagoev	Plovdiv	60.
Do.	Georgi Dimitrov	Kurdjali	30.
Manganese ore	Mangan Ltd. (Obrotchishte)	Varna District	50.
Natural gas	Ministry of Power Supply	Chiren field, in northwest Bulgaria	(1/).
Petroleum:			
Crude	do.	do.	(1/).
Refined barrels per day	Economic Trust for Petroleum Products	Refineries in Burgas, Pleven, and Ruse	260,000.
Steel, crude:	Kremikovtsi Iron and Steel Works	Near Sofia	1,800.
Do.	Stomana Iron and Steel Works	Pernik	1,300.

1/ Insignificant capacity.

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THE MINERAL INDUSTRY OF

CROATIA

By Walter G. Steblez

Prior to the dissolution of the Socialist Federal Republic of Yugoslavia, Croatia was the Federation's chief producer of natural gas and petroleum, a leading producer of iron and steel, and produced a variety of industrial minerals that included bentonite, cement, and gypsum. However, from mid-1991 to early 1992, Croatia was actively involved in a civil war, mainly within the country's own borders. The largely Serbian population in Croatia's Kraina region declared independence from Croatia when certain issues concerning Serbian autonomy within this region apparently were not resolved. By mid-1992, the United Nations supervised a cessation of hostilities within Croatia on the basis of status quo. However, the economy of Croatia reportedly was severely damaged by the conflict. The country's minerals industry reportedly suffered extensive damage at facilities in the aluminum, petroleum, and steel sectors, in addition to shortages of raw materials that were obtained in the past from other Republics of former Yugoslavia. Reportedly, in 1995, the economic situation had not been significantly rectified and there was little activity in the country's minerals-producing sectors.

In view of the civil war that was fought within Croatia for nearly 1 year, the country's Government presumably focused most of its attention on maintaining Croatia's integrity and independence. Some Government activities apparently were directed at maintaining mineral industry operations, when possible, to support the country's war effort and to help maintain socially acceptable levels of employment. However, few details were available during the year concerning specific Government policies that addressed both economic reform or long-term plans to rationalize the major enterprises in Croatia's mineral industry.

The production table for Croatia was compiled from data presented in a variety of statistical publications of the former Yugoslavia through 1994. The major portion of the country's production statistics, however, was obtained from "Statisticki Ljetopis 1994" published by the Central Bureau of Statistics in Zagreb, Croatia, for a limited number of commodities through 1993. *(See table 1.)* The former domestic Yugoslav market was an important element in Croatia's mineral trade. With the dissolution of Yugoslavia, commerce with the country's former domestic trading partners became classified as foreign trade. Moreover, trade with Croatia's former trading partners in the former constituent Republics of Yugoslavia largely had become untenable because of the civil war in Croatia during 1991-92 and in Bosnia and Herzegovina during 1992-95. Additionally, international trade embargoes were levied against several Republics of the former Yugoslav federation that were Croatia's traditional commercial partners. Consequently, Croatia sought to orient its trade to a greater degree toward markets in Europe. Table 2 lists the apparent administrative bodies and subordinate production units for the main branches of the country's mineral industry in 1992. *(See table 2.)*

Energoinvest operated bauxite mines in Bosnia and Herzegovina and Croatia. Jadranski Aluminium's operations were entirely in Croatia. The country's monohydrate (boehmitic) bauxite deposits were suitable for metallurgical end use.

At yearend 1991, Croatia reported extensive damage to the Boris Kidric aluminum smelter at Sibenik as a result of the fighting. The smelter reportedly remained closed through 1994 and Croatian authorities have not indicated when the operation would be restarted. Before the conflict damaged the Sibenik aluminum smelter, Croatia's primary aluminum smelting capacity was approximately 25% of the total for the former Yugoslavia.

Reportedly, Croatia's steel industry facilities were severely damaged in the fighting at the SP MK Zeljezare Sisak at Sisak in the central part of the country and at the Jadranska Zelejzara at Split on the Dalmatian coast. Because of the damage sustained by the country's steel plants during the 1991-92 fighting and the loss of traditional markets in the former Yugoslavia, industry officials indicated that steel production at these facilities had declined by more than 50% compared with that of 1990. Dalmacija Dugi Rat Carbide and Ferro Alloy Works, a producer of ferrochromium near Split in Croatia, also reported disruptions of production during the period of military conflict. Similarly, operations at the Pef Sibenik ferromanganese plant were interrupted for 6 months in 1993 because of power shortages in the Dalmatian provinces of Croatia.

Croatia has produced sufficient quantities of cement, clays, lime, nitrogen, pumice, stone, and other industrial minerals to meet most of the needs of the country's construction and construction materials industries, as well as some of the requirements of the domestic chemical

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industry. The importance of industrial minerals will grow because of post-war reconstruction requirements and rationalization of Croatia's economy and infrastructure.

Croatia's natural gas and petroleum industry apparently did not suffer sustained damage during the fighting from 1991 to 1992: the production of both natural gas and petroleum reportedly continued, but at somewhat lower levels of output. Reportedly, the major foreign supplier of petroleum to Croatia in recent years was Iran. Croatia's pipelines for crude petroleum were 670 km in length, while those for refinery products and natural gas were 310 km and 20 km, respectively.

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TABLE 1
CROATIA: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity 2/		1991	1992	1993	1994	1995e/
METALS						
Aluminum:						
Bauxite		112,000	6,878 r/	1,690	1,400 r/e/	1,500
Metal, ingot; primary and secondary		54,500	20,406 r/	25,956 r/	30,000 r/e/	30,000
Iron and steel:						
Metal:						
Ferrochromium		72,800	56,500	27,300	31,700	31,000
Ferromanganese		22,000 e/	10,000 e/	10,000	10,000	10,000
Ferrosilicomanganese		60,000 e/	15,000 e/	40,000	30,000	30,000
Steel, crude:						
From Siemens Martin furnaces		94,400	--	--	--	--
From electric furnaces		120,000	101,942 r/	73,815 r/	73,000	75,000
Total		214,000	102,000	73,800	73,000	75,000
Silver e/	kilograms	1,600	800	500	500	--
INDUSTRIAL MINERALS						
Barite concentrate e/		2,200	1,500	1,500	1,500	1,500
Cement	thousand tons	1,710	1,768 r/	1,683 r/	1,700	1,700
Clays: e/						
Bentonite		15,000	10,000	10,000	10,000	10,000
Ceramic clay		15,000	10,000	10,000	10,000	10,000
Fire clay, crude		50,000	30,000	30,000	30,000	30,000
Gypsum: e/						
Crude		80,000	50,000	50,000	50,000	50,000
Calcined		11,000	7,000	7,000	6,000	6,000
Lime	thousand tons	261	144	156	150	150
Nitrogen, N content of ammonia	do.	348	426	345	300	300
Pumice and related materials, volcanic tuff e/		650	600	500	500	500
Quartz, quartzite, glass sand		159,000	39,592 r/	23,344 r/	25,000	15,000
Salt, all sources		18,300	28,585 r/	29,643 r/	30,000	28,000
Sand and gravel, excluding glass sand e	thousand cubic meters	2,000	2,000	2,000	2,000	2,000
Stone, excluding quartz and quartzite:						
Dimension: Crude:						
Ornamental	square meters	1,510,000	1,178,622 r/	1,133,873 r/	1,100,000	1,100,000
Crushed and brown, n.e.s.	thousand cubic meters	4,450	3,280	4,160	4,000	4,000
Other e/	cubic meters	30,000	25,000	20,000	20,000	20,000
Sulfur, byproduct of petroleum e/		2,000	2,000	2,000	2,000	2,000
MINERAL FUELS AND RELATED MATERIALS						
Carbon black		18,800	13,479 r/	17,123 ;r/	15,000	20,000
Coal:						
Bituminous	thousand tons	146	120	105	100	100
Brown	do.					
Lignite	do.					
Coke	do.	442	409	421 r/	400	350
Natural gas, gross production	million cubic meters	1,840	1,820	2,068 r/	2,000	2,000
Petroleum: e/						
Crude:						
As reported	thousand tons	1,900	1,743 r/	1,729 r/	1,700	1,600
Converted	thousand 42 gallon barrels	14,100	14,100	12,800	12,000	12,000

e/ Estimated.

1/ Table includes data available through May, 1996.

2/ In addition to commodities listed, common clay also was produced, but available information was inadequate to make reliable estimates of output levels.

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TABLE 2
CROATIA: STRUCTURE OF THE MINERAL INDUSTRY FOR 1995

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies	Location of main facilities	Annual capacity
Aluminum		Boris Kidric, Tvornica Lakih Metala	Smelter at Sibenik, Croatia	75
Bauxite		Jadral, Jadranski Aluminijum	Mines in at Obrovac, Drnis and other locations	450
Coal, Bituminous		Istarski Ugljenokopi Rasa	Mines at Labin and Potpican.	500
Cement		Dalmacija Cement	Partizan plant at Kasel Sucurac	1525
Do.		do.	Prvoborac plant at Solin	884
			"10 Kolovoz" plant at Solin Majdan	440
Do.		do.	Renko Spèrac plant at Omis	140
Natural gas	million cubic feet	do.	Natural gasfields in Bogsic Lug, Molve, and others	70,000
Petroleum:			Oilfields in Croatia and Slovenia:	
Crude	thousand barrels per day	Industrija Nafte (INA)	Benicanci, Zutica, Struzec, Ivanic Grad, Lendava, and others	70
Do.	do.	do.	Refineries at Urinj and Rijeka	160
Do.	do.	do.	Refinery at Sisak	150
Pig iron		Metalurski Kombinat "Zeljezara Sisak"	2 blast furnaces at Sisak	235
Salt	cubic meters per year	Solana "Pag," Solana "Ante Festin"	Marine Salt: Pag Island	13
Steel, crude		SP MK Zeljezare Sisak	Plant at Sisak	401
Do.		Jadranska Zelejezara Split	Plant at Split	120

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THE MINERAL INDUSTRY OF

THE CZECH REPUBLIC

By Walter G. Steblez

The Czech Republic again reported positive economic performance for 1995. The country's gross domestic product (GDP) grew by about 4.8% compared with that of 1994 and industrial output rose by almost 6.0% during the same period. The steep decline in industrial output that occurred from 1991 through 1993, owing to structural changes in the economy during the country's transition from central economic planning to a market-based economic system, appeared to have stopped by early 1994, and recovery continued throughout 1995. The Czech Republic's minerals industry showed stabilization of production, largely in the industrial minerals sector and in the steel industry. On the other hand, metal mining, except that for gold and uranium, had ceased because of unfavorable markets. In the mineral fuels sector, the decline in the output of coal was balanced somewhat during the year by an increase in the production of natural gas and petroleum. The Czech Republic remained an important regional producer of steel, industrial minerals, and building materials. Foreign commercial agreements on gold prospecting and the addition of new capacities in the steel industry were among the noteworthy activities in the minerals industry in 1995.

Taking into account the new economic climate that was emerging in the Czech Republic, the Government began to develop pragmatic programs to bring about the rapid denationalization of the country's economy and, where necessary, the modernization of industrial processes. Realizing that foreign investment could be an appropriate vehicle to help achieve both ends, the Government started to widen the dissemination of public information, much of which was unavailable during the Communist regime. To help address the needs of the country's minerals industries, the Ministry of Industry of the Czech Republic, under advisement from its Department of Minerals Resources and Geological Survey, in 1995 continued to issue the "Mineral Commodity Summaries of the Czech Republic." This document was patterned on similar publications by the U.S. Bureau of Mines and those of several other major market economy countries. Additionally, this report also was published in English and included information on mineral characteristics, domestic ore production and use, mineral deposits and reserves, outlook, the world's main mineral producers, industrial minerals and rocks, building materials, and fossil fuels.[1]

The mining code of the Czech Republic (consolidated text of 1992, Law No. 439/1992) and the decree of the Ministry of Environmental Protection of May 1992, No. 364 on protected areas of mineral deposits, respectively, addressed issues pertaining to the exploitation of the country's mineral deposits and the protection of the environment in the vicinity of the deposits.[2] Reportedly, a new mining law was to have been drafted jointly by the Ministries of the Economy and Environmental Protection. In April, it was announced that separate bills drafted by each agency were joined, but that a number of differences of interpretation of various provisions and definitions still had to be resolved.

The interdependence between the future of the minerals industry of the Czech Republic and the abatement of industrial point sources of pollution continued to be an important issue in the country in 1995. As in other former member countries of the CMEA, the development of heavy industries in the Czech Republic, including those for steel production and the mining and processing of metals, fossil fuels, and industrial minerals, was carried out largely without reference to market economy or environmental considerations from 1946 to 1989. The Czech Republic's industry, compared with those of market economy countries, became relatively inefficient and polluting. Industrial pollution in the Czech Republic had been severe, largely from point sources associated with steelmaking and with low-grade, coal-burning electric powerplants, as well as with the country's cement and chemical industries.

Operative environmental legislation for the Czech Republic was Law No. 17/1992, which set basic definitions and principles regarding environmental protection as well as the obligations of "legal and physical persons (bodies)" for protecting the environment during the use of natural resources. In December 1993, the Ministry of the Environment drafted a report, titled, "The Environmental Policy of the Czech Republic."[3] The report established priorities for the Government's environment policies that accorded with those described in "An Environment for Europe" by the United Nation's Economic Commission for

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Europe. It was based on the requirement to "limit risks to human health and risks which threaten to create irreversible changes and damage to the environment."

Policy proposals specific to mining were covered under the geologic environment component of the report. The given aims were to promote the efficient use of nonrenewable natural resources; limit the contamination of the geologic environment; protect rare natural occurrences, such as geologic outcrops, rare minerals, and palaeontological sites. Proposed measures in pursuit of these goals included restrictions on mining as a basis of the country's source of raw materials; the integration of cutbacks in the mining industry with the establishment of funds for land reclamation; the construction of hazardous waste dumps, including those for radioactive materials; and the enforcement of environmental auditing of mining operations. Additionally, recommendations were made to require a reduction in the consumption of raw materials and energy, increase the use of local secondary raw materials and renewable material resources, and limit exports of primary raw materials.

However, in 1995, Czech sources reported that environmental accession standards established by the European Union (EU) were placing an increasingly heavy strain on the country's industry.[4] In many cases, the investment of foreign capital in the Czech Republic's industry had been discouraged and/or prevented when the scope of funds needed for environmental remediation had been revealed. Reportedly, fees for waste removal in many cases have been growing beyond the means of many industries, thereby affecting both production and investor confidence. Reported;y, some enterprises involved in processing industrial minerals would have to allocate more money to clean up a property than the value of the facilities on the land.

The production results for metals in 1995 showed overall stabilization and some growth. The output of pig iron and crude steel in 1995 appeared to have stabilized at approximately the same level of output that was achieved in 1994. The mine output of most nonferrous metals, however, had ceased or showed only minimum production. Such was the case of mined uranium and zinc ores. (*See table 1.*) The Czech Republic no longer would exploit uneconomic mineral resources, as often was the case when the country's minerals industries were operating under a system of central economic planning. The relatively improved showing of the country's steel and industrial minerals sectors was consonant with emerging market priorities that addressed issues of infrastructural modernization and the export of marketable high value steel-based durable goods. (*See table 1.*) Table 2 lists the administrative bodies as well as subordinate production units of the main branches of the country's mineral industry in 1994. (*See table 2.*)

By yearend 1994, the value of total exports of the Czech Republic increased by about 7% compared with that of 1993 and the value of imports by slightly more than 13%. The member countries of the EU collectively were the Czech Republic's largest trading partner in terms of total exports and imports.[5] However, Russia and other Republics of the former Soviet Union (FSU) maintained their position as a major supplier of mineral and mineral fuel commodities. Major mineral imports by the Czech Republic in 1994 included 6.5 Mt of crude petroleum, which was an increase of 16% compared with that of 1993; 7.3 million cubic meters (Mm^3) of natural gas, an increase of about 8% compared with those of 1993; and about 7.3 Mt of iron ore, or a decrease of slightly more than 3% for the same period. Mineral exports for 1994, selectively published in official trade statistics, included cement, 2.069 Mt; kaolin, 345,000 t; and limestone, 53,000 t, which showed declines of 1%, 19%, and 72%, respectively, compared with those of 1993.[6]

In 1995, Canadian companies continued to play a prominent role in the Czech Republic's gold mining sector. In early 1995, Menora Resources, a Canadian firm based in Toronto, planned to acquire milling royalties and a package of other options at five gold mines in the Czech Republic. Menora was to receive US$0.25 per ton of ore for the first 10 million tons of ore processed, and afterwards US$0.10 per ton of ore treated to a maximum of 11 million tons. The option package involved the trade of 4 million shares by Menora for a 10% working interest in the five mines.[7]

Greenwich Resources Plc. of the United Kingdom reported that its analysis has indicated the existence of a large, low-grade gold deposit at Vacikov-Petrackova Hora in the Czech Republic.[8]/ The data for this study was derived from Greenwich's wholly owned exploration area at Rozmital in the Czech Republic. Reportedly, on the basis of Greenwich's data, it was estimated that the deposit contained 27 Mt of ore grading 1 g/t gold, or about 907,000 troy ounces of contained gold. Gold mineralization occurred in a series of quartz veins within a grandioritic intrusive. It was believed that additional similar intrusives in the area may extend the resource of gold in the region. Area studies conducted by the Czech Government have determined the gold resources to be near or at the surface, which would make them amenable to surface mining. However, Czech Government's assaying of the deposit apparently has understated the gold value by about 8% and a reevaluation of the Czech estimates was conducted during the year.

According to the Ministry of the Economy of the Czech Republic, the Government had spent US$3.8 million on gold exploration by 1995. Of the 27 sites

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where gold has been identified, 16 deposits were selected for additional study.[9]

In 1995, Poldi Ocel, one of the country's main steel producers, reported that domestic demand for steel was showing recovery with the number of contracts from the the Czech Republic's industrial consumers increasing by between 15% and 20% compared with those of 1994.[10] At the same time, Poldi Ocel reported operations to have been at full capacity.

Foreign investment in the steel industry during the year included an agreement between Zelezarny a Dratovny Bohumin (ZDB) steelworks and Bekaert, a Belgian producer of drawn wire and cable, to build a new wire drawing facility at Bohumin.[11] Reportedly, Bekaert was to own 55% of the new factory, 45% would be owned by ZDB. Total investment would amount to about $US33 million and the plant would produce high- and low-carbon steel wires beginning at yearend 1996. Full capacity would be reached by the year 2000 to produce 80,000 t/yr of steel wire.

The two major uranium deposits in the Czech Republic are at Rozna in Western Moravia (hydrothermal mineralization), and at Hamr, near Straz pod Ralskem in Northern Bohemia (uranium-bearing sandstones bounded by chalks). There are also resources of uranium near the Krusne Hory range associated with tertiary sediments. About 60% of the uranium was extracted through underground mining and the balance, at Hamr, by in situ underground chemical leaching. Total commercial resources were estimated at about 139,000 t of uranium metal contained in the ore.

In view of the transition of the Czech economy to a market economy system, the cessation of Russian purchases of Czech uranium for processing, low world market prices for uranium, as well as Slovakia's decision to buy the abundant and less expensive Russian material, the future of this sector would depend on the continued operation of the Dukovany nuclear electric power station and the completion of construction of the Temelin nuclear power station in 1995. In 1995, Government sources indicated that with the completion of the Temelin nuclear powerplant, the country's consumption of uranium would reach almost 700 t. The rated consumption of uranium at the Dukovany nuclear powerplant was 330 t/yr, while that at the two blocks of the Temelin facility would be 360 t/yr.[12] Because of the low international prices for uranium, Czech material has not been competitive in the market, but current stocks reportedly were sufficient for 5 years of operation at the two nuclear electric power facilities.[13] Proposals by the power industry during the year discussed the possibility of temporarily closing mining and processing operations at Bystrice nad Pernstejnem as well as the purchase of a portion of the power industry's uranium requirement in the market, from domestic stocks, as well as imports.[14]

The Czech Republic continued to be a major producer of industrial minerals in the Central European region with resources sufficient to meet both domestic and export needs. Major activities in the country's cement industry in 1995 involved the modernization at two cement plants with the participation of IKN GmbH of Germany. Cementarny a vapenky Prochovice announced plans to install a 3,400-metric tons-per-day (t/d) cooling unit supplied by IKN GmbH. IKN GmbH also was involved in the modernization process at Cizkovicka Cementarna where an existing cooler was modified with the installation of a pendulum cooler with a roller crusher (2,100 t/d).[15]

In the Czech Republic, the brown coal-lignite-producing areas were at Brno, Kladno, Most, Plzen, Skokolov, and Trutnov. Reportedly, 90% of the brown coal-lignite was extracted by surface mining and is typically a high ash and sulfur product ranging from 6.6% to 41.1% in ash content (30% average). The coal's sulfur content ranged from 0.7% to 6.0% (1.8% average). Most of the brown coal and lignite was consumed by the country's electric power generating industry, causing a significant SO_2 emission problem. Bituminous coal was mined entirely underground by the longwall method at the East Bohemia, West Bohemia, Kladno, and Ostrava-Karvina Doly (OKD) coalfields. The Kladno and OKD coalfields were the largest producers of bituminous coal, respectively accounting for about 6% and 88% of the country's total bituminous coal output. About 73% of the coal produced at OKD has been suitable as coking coal. Kladno's entire output consisted of steam coal.

In 1995, owing to a decline in the domestic demand for bituminous coal as well as to imports of cheaper coal from nearby countries, OKD has been forced in recent years to close several mines. However, mining operations in the Karvina region were to continue and the profitability of OKD's overall operations were expected to be supported largely by noncoal mining subsidiaries, such as the coke, chemical, construction, and engineering businesses.[16]

The near-term outlook for the Czech Republic's economy and mineral industry appears to be good, especially in comparison with most other former centrally planned economy countries of Eastern Europe. The country's highly focused and vigorous economic restructuring program apparently has stimulated substantial foreign investment in the country's minerals industries--a trend that is likely to continue for the foreseeable future. With scientific and technical excellence as one of the main components of the country's cultural tradition, the Czech Republic can be expected to extend its influence throughout the region

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known as Eastern Europe as well as the Republics of the FSU. Industries such as steel, ceramics, and construction materials should continue to meet the needs of both the country's domestic and foreign customers.

[1] Mineral Commodity Summaries of the Czech Republic. Geofond, Prague, May 1995.
[2] Rocnik 1992, Sbirka zakonu Ceske a Slovenske Federativni Republiky, Nos. 74 and 87.
[3] The Environmental Policy of the Czech Republic (Draft by the Minister of the Environment), Prague, Dec. 1993.
[4] FBIS-EEU-95-204-A, Oct. 23, 1995, p. 22; from CTK, 1402 GMT, Oct. 13, 1995.
[5] External Trade, Jan.-Dec. 1994, No. 19, Czech Statistical Office, Prague, Feb. 1995, pp. 12-22.
[6] Economic and Social Indicators of Czech Republic, Czech Statistical Office, No. 4, 1994, pp. A-20-A-21.
[7] The Northern Miner, Feb. 20, 1995, p. 19.
[8] Mining Journal (London), Mar. 24, 1995, p. 213.
[9] ___. Aug.,18, 1995, p. 115.
[10] FBIS-EEU-95-083-S, May 1, 1995, p. 13; from CTA, 0708 GMT, Mar. 18, 1995.
[11] FBIS-EEU-95-209-S, Oct. 30, 1995, p. 5; from CTK, 0806 GMT, Sept. 19, 1995.
[12] Mining Journal (London), June 30, 1995, p. 482.
[13] Work cited in footnote 12.
[14] FBIS-EEU-95-083-S, May 1, 1995, p. 17; from CTA, 0612 GMT, Mar. 26, 1995. And, FBIS-EEU-95-071, Apr. 13, 1995, p. 9; from Hospodarske Noviny Apr. 10, 1995, p. 3.
[15] Rock Products - Cement Edition, May, 1995, p. 42.
[16] Mining Magazine, May 1995, v. 172 No. 5, p. 308.

TABLE 1
CZECH REPUBLIC: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity		1991	1992	1993	1994	1995 e/
METALS						
Aluminum, secondary		--	--	30,000 e/	48,339 r/	48,000
Antimony, mine output, Sb content		384 r/	224 r/	--	--	--
Antimony, metal		324	223	--	--	--
Copper:						
Metal:						
Refined, primary 2/		600	500	200	--	--
Refined, secondary		20,000 e/	20,000 e/	20,000 e/	23,323 r/	20,000
Gold metal	kilograms	564	521	512 r/	75	-- 3/
Iron and steel:						
Iron ore:						
Gross weight	thousand tons	102	64	-- 3/	--	--
Fe content		32,844 r/	20,608 r/	-- r/	--	--
Metal:						
Pig iron	thousand tons	5,810	5,082 r/	4,668 r/	5,287 r/	5,289 3/
Ferroalloys, total electric furnace e/	do.	1	1	1	1	1
Steel, crude	do.	7,972 r/	7,340	6,732 r/	7,075 r/	7,000
Semimanufactures	do.	7,167 r/	7,000	7,000	6,445 r/	6,400
Lead:						
Mine output, Pb content		2,100	1,100	100	--	--
Concentrate, gross weight		2,011 r/	2,000	2,000	-- r/	--
Pb content of concentrate		1,030 e/	1,000	1,000	500	--
Metal, secondary		17,800	24,000	20,000	20,000	20,000
Silver	kilograms	8,900	6,200	500	100	-- 3/
Tin:						
Mine output, Sn content		15	--	--	--	-- 3/
Metal, primary and secondary		118 e/	115	115	100	100
Tungsten, mine output, W content		12	--	--	--	-- 3/
Uranium, mine output, U content		1,827 r/	1,631 r/	1,018 r/	537	611 3/
Zinc: e/						
Mine output:						
Ore (Pb-Zn), gross weight		353,000 3/	220,000	250,000	15,000	-- 3/
Zn content of ore		8,500 3/	4,400 3/	1,500 3/	100	-- 3/
Concentrate, gross weight		9,760 3/	9,000	9,000	9,000	--
Zn content		4,800	4,400	4,000	4,000	--
Metal, secondary		811 3/	1,070 3/	1,000	1,000	1,000
INDUSTRIAL MINERALS						
Barite		1,000	--	--	--	-- 3/
Cement, hydraulic	thousand tons	5,610	6,145 r/	5,393 r/	5,303 r/	4,825 3/

See footnotes at end of table.

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TABLE 1--Continued
CZECH REPUBLIC: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity		1991	1992	1993	1994	1995 e/
INDUSTRIAL MINERALS--Continued						
Clays:						
Bentonite	thousand tons	125	135	63	65	54 3/
Kaolin	do.	2,913 r/	2,530	2,336 r/	2,706 r/	2,800 3/
Other	do.	947	903	1,018	823	915 3/
Diatomite		68,000	57,000	39,000	40,000	29,000 3/
Diamond, synthetic e/	carats	5,000	5,000	5,000	5,000	5,000
Fertilizer, manufactured:						
Nitrogenous, N content		182,000	180,000 e/	180,000 e/	247,000 r/	264,000 3/
Phosphatic, P2O5 content		46,300	40,000 e/	40,000 e/	13,700	14,000
Potassic, K2O content		23,100	20,000 e/	20,000 e/	21,900	22,000
Mixed		55,300	50,000 e/	50,000 e/	156,700 r/	117,000 3/
Feldspar		130,000	152,000	203,000	170,000	183,000 3/
Fluorspar		82,000	22,000	22,000	10,000	-- 3/
Gemstones, crude, pyrope-bearing rock		31,000	45,000	34,000	33,000	35,000
Graphite		47,000	20,000	27,000	25,000	27,000 3/
Gypsum and anhydrite, crude		569,000	660,000	560,000	591,000	542,000 3/
Lime, hydrated and quicklime	thousand tons	1,391 r/	1,337 r/	1,147 r/	1,206 r/	1,186 3/
Mica		--	--	--	--	3,803 3/
Nitrogen, N content of ammonia e/		200,000	200,000	200,000	287,000	250,000
Quartz		65,000	46,000	23,000	2,000	3,000 3/
Salt		183,597 r/	180,000	180,000	180,000	180,000
Sand and gravel:						
Common sand and gravel	thousand cubic meters	12,778 r/	12,772 r/	12,245 r/	11,465 r/	10,525 3/
Foundry sand	thousand tons	919	1,075 r/	954	1,093 r/	964 3/
Glass sand	do.	918	888	781	862	1,026 3/
Stone:						
Basalt (for casting)		72,000	107,000	134,000	85,000	108,000 3/
Dimension stone	thousand cubic meters	198,000	176,000	177,000	223,000	200,000
Limestone and other calcareous stones	thousand tons	11,461 r/	11,134 r/	10,491 r/	10,205 r/	10,092 3/
Building Stone	thousand cubic meters	9,517 r/	8,412 r/	7,488 r/	8,224 r/	9,000
Sulfur, byproducts, all sources e/		20,000	20,000	20,000	20,000	20,000
Sulfuric acid e/		300,000	300,000	300,000	350,000	350,000
Wollastonite		--	--	--	--	800 3/
MINERAL FUELS AND RELATED MATERIALS						
Coal:						
Bituminous	thousand tons	25,769 r/	24,691 r/	23,862 r/	20,910 r/	21,309 3/
Brown and lignite	do.	77,488 r/	69,519 r/	68,154 r/	60,728 r/	58,773 3/
Coke	do.	6,467 r/	5,721 r/	5,236 r/	5,144 r/	4,945 3/
Fuel briquets from brown coal	do.	892	800	800	499 r/	470
Gas:						
Manufactured, all types	million cubic meters	5,380	5,000 e/	5,000 e/	1,136	1,100
Natural, marketed 4/	do.	125	132	106	154	165 3/
Petroleum:						
Crude:						
As reported	thousand tons	61	80	107	131	149 3/
Converted	thousand 42-gallon barrels	414	542	550	889	1,010
Refinery products e/	do.	90,000	90,000	70,000 r/	40,000 r/	40,000

e/ Estimated. r/Revised.

1/ Table includes data available through June 1996. In addition to the commodities listed, arsenic, diatomite, dolomite, illite, sodium compunds, sulfuric acid, talc, and zeolite are produced, but information is inadequate to make reliable estimates of output levels.

2/ Produced as a byproduct from noncopper ores.

3/ Reported figure.

4/ Includes gas produced from coal mines. Gross output of natural gas is not reported, but it is believed to exceed reported marketed output by a relatively inconsequential amount.

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TABLE 2
CZECH REPUBLIC: STRUCTURE OF THE MINERAL INDUSTRY FOR 1995

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies 1/	Location of main facilities 2/	Annual capacity
Antimony ore	Krasna Hora	Central Bohemia	NA
Cement	Cizkovice, Hranice, Karlov Dvor, Lochkov, Pracovice, and Velary	Bohemia	3,500
Do.	Bystre, Malomerice, Mokra, Ostrava-Kunice, and Zahorie	Moravia	2,800
Clay, koalin	Mines in Karlove vary area	West Bohemia	450
Do.	Mines in Plzen area	Central Bohemia	150
Coal:			
Bituminous	Mines in OKD coal basin	Ostrava-Karvina, north Moravia	22,100
Do.	Mines in KD coal basin	Kladno, central Bohemia	3,000
Brown	SHD administration	Most, northwest Bohemia	61,000
Do.	HDB administration	Sokolov, west Bohemia	17,000
Lignite	JLD administration	Hodonin, south Moravia	5,000
Copper, Ore	Zlate Hory	North Moravia	300
Lead-zinc, ore	Horni Benesov and Zlate Hory	do.	400
Lead, metal, secondary, Refined	Kovohute Pribram	Pribram	26
Natural gas billion cubic meters	Gasfields around Hodonin	South Moravia	25
Petroleum:			
Crude	Oilfields around Hodonin	do.	140
Refinery	Kolin, Kralupy, Pardubice, and Zaluzi	Bohemia	NA
Steel, crude	Nova Hut sp (Ostrava)	Kunice-Ostrava	3,800
Do.	Zelezarne Vitkovice	Vitkovice-Ostrava	1,900
Do.	Trinecke Zelezarny (Trinecke Iron and Steel Works)	Trinec	3,000
Do.	Poldi United Steel Works	Kladno-Prague	1,700
Do.	Zelezarny Bila Cerkev	Hradek-Rokycany	300
Do.	Zelezarny Veseli	Veseli and Moravou	300
Do.	Zelezarny Chomutov sp	Chomutov	350
Do.	Bohumin Iron and Steel Works	Bohumin	400
Tin, ore	Krasno (Stannum) and Cinovec	Northwest Bohemia	300

NA Not available.

1/ All mining companies are Government owned.

2/ Names and locations of mines and crude oil refineries are identical.

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THE MINERAL INDUSTRY OF

DENMARK AND GREENLAND

By Harold R. Newman

Denmark

The mining and quarrying and the mineral processing sectors traditionally have not been a driving force in Denmark's economy. Employment in all aspects of the minerals industry (mining and quarrying, basic metal industry, etc.) accounts for about 2% of total employment in Denmark.

Continued close cooperation with the other members of the European Union (EU) was very important for Denmark because the other member countries of the EU remain the major market for the country's very important export activities. For example, more than 80% of steel produced in Denmark was exported and of that total, more than 50% was shipped to other EU countries. The same is true for other minerals and mineral products such as cement, of which almost three-quarters of Danish production was exported.

The Danes traditionally have been environmentally conscious. The mining and metals industry worked closely with the Ministry of Environment, local and community governments, and citizens groups to minimize any adverse effects to the environment. A common goal of the steelworks and other industrial concerns was to make use of as much raw material taken into the plant as possible and to maximize the use of any byproducts, such as flue dusts.

There was a 9% decrease in crude steel production compared with that of 1994. However, production was still higher than that of previous years. The weakening of the market was attributed to considerable EU imports of steel from Eastern Europe and other non EU countries. Denmark's steel industry was small compared to the majority of other EU countries and, as a result of its size, was not affected by the proposed cuts being studied by the European Commission in its efforts to make the EU steel industry more competitive with those of other countries. *(See table 1.)*

The Geological Survey of Denmark and Greenland (GEUS) conducted a limited investigation of heavy mineral potential in middle, southern, and western Jutland. Two types of heavy mineral environments were identified by GEUS. One environment was associated with marine sediments and contained ilmenite, rutile, and zircon. The ilmenite was reported to contain approximately 52% titanium dioxide (TiO_2). The other occurrence was associated with a palaeobeach environment and contained ilmenite, rutile, zircon, and a small amount of leucoxene. The TiO_2 content was reported to be approximately 58%.

Denmark has no known economically exploitable reserves of metallic ores, but has large reserves of nonmetallic materials such as chalk, diatomaceous earth, limestone, and sand and gravel. Denmark's industrial minerals sector is based on easy accessible materials such as chalk and limestone and is well developed. Cement, chalk for paper filler, ground limestone, burnt lime, and agricultural lime are produced.

Denmark is the only commercial producer of moler, which consists of a natural mixture of diatomite and up to 20% to 25% smectite clay. This product has a variety of applications. Moler is an important ingredient of insulation bricks.

Aalborg Portland A/S, Denmark's sole cement producing company, signed an agreement with a nearby powerplant to supply chalk slurry for flue gas desulfurization (FGS). The company would receive the FGS gypsum in return for use in cement production. The company also reported an $8 million investment to fully utilize its advanced white kiln system.

Petroleum production continued to exceed consumption, allowing Denmark to stay self-sufficient in petroleum. Increase in natural gas production allowed Denmark to continue exporting about 20% of production.

The structure of the Danish mineral industry, listing its major components, is shown in table 2.

Greenland

Since the cessation of mining activities in 1990, Greenland, a self-governing overseas administrative division of Denmark, has been looking for a means of diversifying its economy, which is presently based almost entirely on fishing and hunting. Recent legislation has created favorable licensing terms and investment rules, and this together with a varied geology has resulted in increased mineral exploration in Greenland.

In 1995, seven companies were conducting exploration under 45 licenses over more than 28,000 square kilometers. Exploration has been directed towards base metals, diamonds, gold, industrial minerals, iron, nickel, and platinum-group metals. Both the Danish and Greenland Governments were actively encouraging mineral exploration activities.

Nunaoil A/S, owned by the Danish and Greenland Governments, reported it had outlined four areas of primary gold mineralization near the town of Nanortalik.

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In particular, one 800 meter (m) long outcrop of gold-bearing quartz veins was reported to have an average grade of 50 grams per ton over 0.5 m. The gold-bearing veins are hosted in fine to medium-grained mafic metavolcanics. Exploration drilling was to continue in 1996.

RTZ Mining and Exploration Ltd. was reevaluating the Isukasia (Isua) iron ore deposit, first discovered in 1965 by Cryolite Co., and reported exploration drilling through the Inland Ice had demonstrated the presence of hematite in banded iron formations within a regional supracrustal belt that stretches under the ice sheet. Drilling was to continue in 1996.

Platinova A/S was continuing exploration of its massive sulfides deposit at Citronen Fiord. After three seasons of drilling, the company reported it had defined a 3 kilometer (km) by 10 km mineralized trend representing a resource of an estimated 25 million metric tons (Mmt) grading 7% zinc and 1% lead.

Feasibility studies continued on the possibility of a 170,000 metric tons per year (t/a) zinc refinery near Nuuk that would treat Canadian and possibility Irish concentrates that are currently being treated in Europe. The refinery would use locally available hydroelectricity, and the use of pressure-leach technology and underground waste storage would minimize environmental pollution.

The recent discovery of diamondiferous kimberlites in Canada's Northwest Territories has led to a reappraisal of Greenland's diamond potential. RTZ completed a kimberlite exploration program in northwest Greenland with reported negative results and Quadrant Resources Ltd. was conducting exploration for diamond indicator minerals within the Archean craton in southwest Greenland.

There have been indications of petroleum deposits in the southwest area of the Nuusuaq Peninsula off the central western coast of the island and of natural gas reserves in water depths ranging from 200 m to 1,500 m.

Denmark has a well developed modern transportation system. Standard gauge rail lines totaling 2,770 km, of which 2,210 km were operated by the Danish State Railways and 650 km were privately owned and operated. Highways consisted of 66,482 km, of which 64,551 km were paved. Inland waterways totaled 417 km. Principal ports were Ålborg, Århus, Copenhagen, Esbjerg, and Frederica. There were numerous secondary and minor ports.

The Government continued its policy of tempering the economy to reduce unemployment and keep inflation in check. These policies were expected to continue.

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TABLE 1
DENMARK: APPARENT PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity		1991	1992	1993	1994	1995 e/
Aluminum metal, secondary		12,000	15,200	14,000	15,000	14,000
Cement, hydraulic		2,020,000 r/	2,072,000	2,270,000 r/	2,430,000	2,200,000
Chalk		363,000 r/	355,000	386,000 r/	414,000	400,000
Clays:						
Fire clay		2,060 r/	2,040	13,400 r/	1,530	2,000
Kaolin		17,057 r/	3,503	3,500 e/	3,500 e/	3,500
Other		1,790 r/	1,470	267 r/	224	230
Cryolite		15,000 e/	--	--	--	--
Diatomaceous materials: e/						
Diatomite		1,000	1,000	1,000	1,000	1,000
Moler		95,000	95,000	95,000	95,000	95,000
Extracted moler 2/	thousand cubic meters	190	190	190 e/	190 e/	190
Gas:						
Manufactured e/	terajoules	1,670 r/	1,700	1,700	1,700	1,700
Natural:						
Gross 2/	million cubic meters	5,760	6,200	6,350	6,900 e/	6,500
Marketable	do.	3,720	3,850	4,270	4,630	4,500
Iron and steel metal, steel: 2/						
Crude		633,000	591,000	603,000	722,000	654,000
Semimanufactures		518,000	525,000	527,000	638,000	621,000
Lime, hydrated and quicklime		113,788 r/	128,347 r/	123,531 r/	125,000	125,000
Natural gas plant liquids e/	thousand 42-gallon barrels	42,000	43,500	48,000	48,000	46,000
Nitrogen, N content of ammonia		1,500 e/	1,500 e/	1,770	1,700	1,600
Peat		183,689 r/	194,983	188,709	190,000	190,000
Petroleum:						
Crude 2/	thousand 42-gallon barrels	51,900	58,200	63,500	68,800	65,000
Refinery products:						
Liquefied petroleum gas	do.	1,670	1,450 r/	1,700	1,600	1,600
Gasoline	do.	13,200	16,200 r/	12,800	11,700	12,000
Naphtha	do.	1,290	1,910 r/	1,210	1,200	1,200
Mineral jelly and wax	do.	8 r/	4	4	4	4
Jet fuel	do.	1,500	1,180	1,630	1,930	1,800
Kerosine	do.	209	171	109	110 e/	100
Distillate fuel oil	do.	27,900	28,700 r/	31,400	28,400	28,000
Refinery gas e/	do.	1,700	1,700	1,700	1,700	1,700
Lubricants	do.	318	324	300 e/	260	300
Residual fuel oil	do.	13,800 r/	13,300 r/	15,600 r/	13,700	13,500
Bitumen and bituminous mixtures	do.	61	63	60 e/	52	50
Petroleum coke e/	do.	3	3	3	3	3
Total	do.	61,659 e/	65,005 e/	66,516	60,659	60,257
Phosphates, crude, gross weight		329	--	1,480	1,270	1,200
Salt, all forms		550,150	528,429	591,055	583,000	576,000
Sand and gravel: e/						
Onshore	thousand cubic meters	22,000	20,000	20,000	20,000	20,000
Offshore	do.	6,000	5,000	5,000	5,000	5,000
Total	do.	28,000	25,000	25,000	25,000	25,000
Of which, sand, industrial (sales) e/	do.	130	125	125	25	50
Stone:						
Dimension (mostly granite) e/	cubic meters	500	385	385	385	400
Limestone:						
Agricultural		1,130,000 r/	806,000	584,000 r/	703,000	700,000
Industrial		220,000 r/	217,000	220,000 r/	252,000	250,000
Sulfur, byproduct		6,264	6,982 r/	10,357 r/	10,100	10,000

e/Estimated. r/ Revised.

1/ Table includes data available through May 1996, which was based on reported sales of domestically produced mineral commodities.

2/ Production.

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TABLE 2
DENMARK: STRUCTURE OF THE MINERAL INDUSTRY FOR 1995

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity
Cement		Aalborg Portland A/S	Plant at Rordal	3,000
Chalk		A/S Faxe Kalkbrud	Quarries at Stevns and Sigerslev	250
Diatomite (moler)		Skamol-Skarrehage Molervaerk A/S	Quarries on Mors and Fur (Fry) Islands	85
Do.		Dansk Moler Industri A/S	Quarries on Fur Island	50
Kaolin		Aalborg Portland A/S	Mine and plant on Bornholm Island	25
Lime		A/S Faxe Kalkbrud (Aalborg Portland Holding A/S)	Plant at Stubberup, near Fakse, on Zealand Island	190
Natural gas	million cubic meters	Maersk Olie og Gas A/S	Roar and Tyra Gasfields, Danish North Sea	2,550
Petroleum:				
Crude	barrels per day	Dansk Undergrunds Consortium	Dan, Gorm, Rolf, and Tyra oilfields, Danish North Sea	127,000
Refined	do.	A/S Dansk Shell	Fredericia	55,000
Do.	do.	Kuwait Petroleun Refinig A/S	Gulfhavn	56,500
Do.	do.	Statoil A/S	Kalundborg	65,000
Salt		Dansk Salt I/S	Mine (brine) at Hvornum, processing plant at Mariager	600
Steel		Danish Steel Works Ltd. (Det Danske Stalvalsevaerk A/S) (30% Government owned)	Plant at Frederilsvaerk	750

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THE MINERAL INDUSTRY OF

ESTONIA

By Richard M. Levine

Estonia's mineral industry consisted primarily of mining oil shale, peat, and industrial minerals including clays, limestone, and sand and gravel; phosphate mining in Estonia had ceased because of environmental concerns.

In 1995 Estonia's economy continued its upwards trend as the GDP is estimated to have increased by 4% compared with 1994, following a 3% decrease in 1994, a 7% decrease in 1993, and a 14% decrease in 1992. By yearend 1995, almost three-fourth's of the country's large state enterprises had been privatized with the next stage of privatization systems, and ports, including Estonslanets, the national oil shale producer, Esti Energia, Esti Telekom, the Estonian Railways, and the Tallinn port.

The Estonian mining law passed in 1994 establishes requirements for environmental protection for mining as well as providing legislation regarding exploration and extraction. The country has reclaimed over 80% of the more than 10,000 hectares of land disturbed by oil shale mining. Oil shale was a major source of energy, but its use in powerplants was causing serious environmental problems. Almost all of the land reclaimed from oil shale mining is in timber and only a very small amount returned to agricultural use, owing in part to difficulties encountered in removing, handling, and replacing overburden horizons during the mining cycle. The potential exists to reclaim larger areas for appropriate species of crops and grasses.

Estonia was the major producer of oil shale in the FSU, producing 80% of the FSU's total output. In 1995 Estonia produced 13.3 million metric tons (Mt) which was far below peak production of about 30 million metric tons per year (Mt/yr) in the early 1980's. Production of oil shale since then has been continuously decreasing.

About one-half of the oil shale had been mined from open pits and the other one-half from underground mines. Six underground mines and three open pits had been in operation. Over 60% of the ore undergoes beneficiation. Although surface mining of oil shale is more economical and its percentage of total mined output will continue to increase, owing to environmental reasons and lack of finances to acquire new stripping and loading machinery, it is predicted that about 40% of output will continue to be extracted from underground mines.

Oil shale reserves, according to Estonian assessments, were estimated to be 660 Mt, with additional resources that could equal 1 billion t. Existing reserves are deemed adequate until the year 2030, with a prognosticated increase in the mining and utilization of oil shale of 3% to 4% per year. The Soviet reserve classification, however, did not base reserve calculations on an assessment of whether reserves could be economically mined under present market economy prices with existing technology; and therefore, the economics of oil shale mining and utilization at some point may have to be reevaluated by Estonia in terms of market economy criteria.

Over 80% of Estonia's oil shale was used for energy generation and the remaining oil shale was used for chemical production. The main consumers of oil shale are the Pribaltiskiy and Estonskaya powerplants, the Kokhtla-Yarve oil shale processing plant, the Kiviyli oil shale chemical plant in the City of Slantsy in Russia, and a powerplant in Kokhtla-Yarve.

Although oil shale is Estonia's primary source of energy, the country was dependent upon Russia for oil and natural gas.

Ground phosphate for direct application had been produced at the Maardu deposit east of Tallinn, but both as a result of the depletion of this deposit and the serious environmental effects of phosphate mining, production had ceased. Estonia's reserves of marine phosphorite deposits were among the largest in Europe. However, plans to develop two new deposits, the Tools and Kabala, in the Rakvere area, had not been undertaken because of serious environmental concerns.

In 1995 one of Russia's major oil producers, LUKoil, and Denmark's Eurodek won an international tender to build a petroleum products and liquid chemical loading terminal at Estonia's Muuga port on the outskirts of Tallinn. The terminal will be initially designed to handle 1.5 Mt/yr of petroleum products and liquid chemicals, with plans for potential expansion to handle 2.5 Mt/yr.

Estonia has the potential to produce only peat and limestone for export, unless Estonia finds an environmentally acceptable way to develop its phosphate reserves. Although Estonia is a large oil shale producer, there does not appear to be a significant export market for this product. The majority of Estonia's other mineral production, consisting mainly of sand, gravel, and clays, is for local consumption. Estonia, because of its small size and mineral endowments, will have to continue to import the majority of its needed minerals.

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OTHER SOURCES OF INFORMATION

State Statistical Office of Estonia
15 Endla St.
EE-0100 Tallinn, Estonia
Telephone (372-2) 45 16 68, Fax (372-2) 45 39 23

TABLE 1
ESTONIA: ESTIMATED PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity		1992	1993	1994	1995
Amnonia, nitrogen content		117,000	115,000	114,000 2/	138,000 2/
Cement		600,000	500,000	402,000 2/	417,000 2/
Clays:					
For brick	million cubic meters	100,000	90,000	90,000	90,000
For cement		70,000	60,000	60,000	70,000
		,	,	,	13 310,000 2/
Peat		1,500,000	1,300,000	1,274,000 2/	952,200 2/
Sand and gravel	cubic meters	15,000,000	14,000,000	14,000,000	14,000,000
Silica sand, industrial	do.	30,000	25,000	25,000	25,000

1/ Table comprised of estimates based on information available as of June 29, 1996.
2/ Reported figure.

TABLE 2
ESTONIA: STRUCTURE OF THE MINERAL INDUSTRY FOR 1995

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies	Location of main facilities	Annual capacity e/
Amnonia, nitrogen content	Kohtla-Jarve nitrogenous fertilizer plant	Kohtla-Jarve	50
Cement	Punane-Kunda plant	Punane-Kunda	1,500
Limestone, for cement	Punane-Kunda deposits	Punane-Kunda region	NA
Oil shale	Estonslanets associations: includes seven mines, four open pits, and five beneficiation plants	Kokhtla-Jarve	25,000
Peat	388 deposits under exploitation	Production in all regions of country, but major facilities in northern and southeastern part of country	6,000
Phosphate rock	Maardu (operation suspended)	Maardu	500
Sand, for glass	Piuza deposit	Southeastern part of country	50
Sand and gravel	Production at more than 700 deposits, largest enterprises: Silikat association exploiting Tallinn deposit	Tallinn region	2,000,000 cubic meters
Do.	Akhtmeskiy industrial materials complex exploiting Panyarve deposit	Pannyarve region	1,500,000
Do.	Vyrukivi plant exploiting Abissaare, Koryusmyae, Pyussa-palu deposits	Southeastern part of country	1,500,000
Do.	Tartu construction materials plant exploiting Vooremyagi and Kukemetsa deposits	Tartu region	800,000

e/ Estimated. NA Not available.

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THE MINERAL INDUSTRY OF

FINLAND

By Harold R. Newman

On January 1, 1995, Finland acceded to the European Union. At that time amendments to the Finnish Mining Law took effect which allow any individual, corporation, or foundation having its principal place of business or central administration within the EU to enjoy the same rights to explore and exploit deposits of minerals and ores as any Finnish citizen or corporation. Increased foreign activity in exploration has already resulted in the discovery of a major diamond field in northern Finland by Malmikaivos Oy.

Government involvement in the mineral industry was considerably higher than in any of the other EU countries. Government-owned companies; Finnminers Group (hard-rock drilling/loading and ore processing), Kemira Oy (chemicals), Outokumpu Oy (base metals and mining technology), and Rautauukki Oy (steel production), dominated the domestic mineral industry, while Government organizations, the State Geologic Research Institute and the State Technological Research Center, were active in exploration and research.

In spite of the relative scarcity of natural resources, Finland wields considerable influence on the global mining industry. Because of Outokumpu and Finnminers, Finland is a world leader in underground mining technology, ore processing, and metallurgy.

The country has a well established mineral processing and refining industry, however, the diminishing supply of indigenous metalliferous raw materials required most of the feed for smelters to be imported (100% of iron ore concentrate, 80% of zinc concentrate, and 60% of nickel matte and concentrate). There was a decline of metallic ore production while output of industrial minerals remained fairly constant. *(See table 1.)*

The major mineral resources companies are shown in table 2. The only chromite mine in Finland, Outokumpu's Kemi Mine on the coast of the Gulf of Bothnia, has estimated proven and possible ore reserves of about 70 Mt. This was the most significant chromite deposit in Europe. By the end of 1995, some 19 Mt of ore had been produced. Current output was reported to be around 1 Mt/yr.

Although it has no primary copper mines, Finland does produce copper as an associated mineral from Outokumpu's primary zinc mine at Pyhäsalmi. Expansion and modernization of Outokumpu's copper and nickel production lines, which use domestic and imported feedstock, were completed at Harjavalta and Pori and full production reportedly was reached at yearend. The project raised blister copper capacity from 110,000 t/yr to 160,000 t/yr, cathode copper production from 70,000 t/yr to 125,000 t/yr, and nickel capacity from 18,000 t/yr to 32,000 t/yr.

Finland has never been a major gold producer although the Lapland greenstone belt in northern Finland hosts a number of gold occurrences. Outokumpu's Saattopora Mine produced 2.1 Mt of ore grading 3.3 grams per ton (g/t) gold and 0.3% copper from 1988 to mid-1995 when reserves were exhausted and the mine was closed.

Terra Mining Oy's Pahtavaara Mine was scheduled to start operation in June 1996, with a planned output of 400,000 t/yr of ore grading 3-4 g/t gold. Estimated reserves would allow for a 5 year production life. Exploration for gold was being conducted by several companies, both domestic and foreign, as well as the Geological Survey of Finland (GSF). Activity was mainly centered on the Lapland Greenstone Belt, the Archean Greenstone Belts of eastern Finland and the Svecofennian Schist Belt in the south.

The only remaining domestic nickel mine in operation in 1995 was Outokumpu's Hitura Mine. Both the Enonkoshi Mine and the Vammala mine was closed in 1994. Hitura has produced over 8 Mt ore grading 0.55% nickel and 0.20% copper since 1965.

All steel production in Finland was from imported concentrates and iron pellets. Two-thirds of the raw material came in the form of fines from Sweden's Luossavaara-Kiirunavaara AB The balance came from Russia in the form of iron pellets from Kostamus and fines from Olenogorsk. Outokumpu Steel Oy was in the process of expanding capacity at its Tornio plant to 540 mt/a hot- and cold-rolled stainless steel at a reported price of $340 million.

The only mine producing zinc in 1995 was Outokumpu's Pyhäsalami Mine at Pyhajarvi. The zinc concentrate was shipped to the Kokkola smelter while the associated copper concentrates was shipped to the Harjavalta smelter. Pyhäsalami, together with Outokumpu's Tara Mine in Ireland, supplied about 80% of the feed for the Kokkola smelter. Exploration in the vicinity of the existing mines led to the discovery of a small zinc deposit at Mullikkorame, just north of the Pyhäsalmi Mine.

According to GSF, Malmikaivos Oy discovered a series of kimberlite bodies in northern Finland. Malmikaivos, a

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subsidiary of Ashton Mining of Australia, has discovered some 30 kimberlite pipes, half of which were diamondiferous. Two pipes, which were closely studied, were reported to contain substantial quantities of clear and colorless diamonds. A surface sample of 23 metric tons (t) was taken from a pipe with a 2 hectare (ha) area, which yielded some 26 carats per 100 t (ct/100 t), mostly of good quality. Another pipe, slightly over 1 ha, contained 13 to 26 ct/100 t based on a 9.4 t sample. Several other companies were active in diamond exploration, none of whom had issued any preliminary findings at yearend.

Finnminerals Oy was the largest producer of paper-grade talc in Europe and Finland's sole producer of talc. Previously part of the largest European paper conglomerate, UPM-Kymmene, Finnminerals was to be sold to Western Mining Corp. Holdings Ltd. of Australia (50%) and Plüss-Staufer AG of Switzerland (50%). The company also has talc slurry plants in the Netherlands and Sweden.

GSF has placed emphasis on exploration for pigment minerals, such as ilmenite, high quality carbonates and kaolin. Also, a number of dimension stone deposits were being assessed by various companies.

Finland was one of the largest energy consumers in western Europe. Only about one-third of its energy requirements were satisfied by indigenous sources, namely, hydro and nuclear power, peat, and wood. All other energy sources, such as coal, natural gas, and petroleum were imported.

Finland had a total of 5,924 km of railroads, of which 1,445 km was electrified and 480 km had multiple tracks. Nearly 99% was state-owned and operated by the Finnish State Railways. Most of the 77,000 km of highways were in the more densely populated southern part of the country. There were about 3,700 km of inland waterways suitable for steamers. There were five major ports, Helsinki, Oulu, Pori, Rauma, and Turku.

The GSF has identified a number of mineral deposits for which information is available. The likelihood of additional discoveries may be enhanced with the entrance of foreign companies into the Finnish mineral industry. Despite recent discoveries, the future of the Finnish mineral industry rests mainly on metallurgy. As a result of the expansion of Harjavalta and Pori smelters, Outokumpu is expected to be involved in new foreign ventures to be assured a source of raw material.

TABLE 1
FINLAND: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity		1991	1992	1993	1994	1995 e/
METALS						
Aluminum metal, secondary		22,100	27,300	29,900	35,466	36,000
Cadmium metal, refined		593	590	785	876	850
Chromite:						
Gross weight:						
Lump ore e/	thousand tons	320	250	191	225	250
Concentrate e/	do.	133	229	300	341	350
Foundry sand e/	do.	20	20	20	7	10
Total	do.	473	499	511	573	610
Cr2O3 content:						
Lump ore e/	do.	65	54	45	76	80
Concentrate	do.	120	130	170	150	150
Foundry sand e/	do.	5	3	3	3	3
Total	do.	190	187	218	229	233
Cobalt, metal, powder, and salts		1,503	2,100	2,150	3,000	3,610
Copper:						
Concentrate, gross weight		43,883	37,397	44,154	34,410	35,000
Mine output, Cu content		11,732	10,246	11,131 r/	13,243	12,000
Metal:						
Smelter		90,055	110,502	107,201	129,265	130,000
Refined		64,455	70,948	73,373	69,177	70,000
Gold metal	kilograms	1,831	1,559	1,385	1,372	1,400
Iron and steel, metal:						
Pig iron	thousand tons	2,331	2,452	2,535	2,597	2,600
Ferroalloys, ferrochromium	do.	190	187	218	254	300
Steel, crude	do.	2,890	3,076	3,255	3,419	3,176
Semimanufactures, rolled	do.	2,480	2,300 e/	2,300 e/	3,121	3,242 2/
Lead, mine output, Pb content		1,333	576	--	--	--
Mercury		74	85	98	83	90
Nickel:						
Concentrate, gross weight		121,259	135,200	127,400	107,865	110,000
Mine output, Ni content		9,090	9,270	8,290	7,652	4,382
Metal, electrolytic		13,847	14,781	14,777	16,902	16,927 2/

See footnotes at end of table.

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TABLE 1--Continued
FINLAND: PRODUCTION OF MINERAL COMMODITIES1/

(Metric tons unless otherwise specified)

Commodity		1991	1992	1993	1994	1995 e/
METALS--Continued						
Platinum-group metals: e/						
Palladium	kilograms	100	100	100	96	100
Platinum	do.	283	269	--	37	--
Selenium metal	do.	35,200	30,000	30,400	29,690	30,000
Silver metal	do.	30,322	27,168	15,896	26,098	25,000
Zinc:						
Concentrate, gross weight		108,000	59,500	42,400	41,971	42,000
Mine output, Zn content		42,552	32,817	22,529	16,916	16,000
Metal		170,398	170,523	170,934	173,200	170,000
INDUSTRIAL MINERALS						
Cement, hydraulic	thousand tons	1,324	1,129	835	864	900
Feldspar		53,337	47,470	51,477	43,483	42,000
Lime e/	thousand tons	225	241 2/	250	421	350
Mica		4,693	5,134	4,488	5,591	5,000
Nitrogen, N content of ammonia		23,600	10,000 e/	10,000 e/	11,894	12,000
Phosphate rock, apatite concentrate:						
Gross weight	thousand tons	472	555	628	657	650
P2O5 content	do.	171	201	227	236	235
Pyrite, gross weight	do.	724	653	691	839	840
Sodium sulfate e/	do.	33	30	30	36 2/	36
Stone, crushed:						
Limestone and dolomite:						
For cement manufacture	thousand tons	1,714	1,554	1,005	1,047	1,100
For agriculture	do.	1,120	796	1,035	898	900
For lime manufacture	do.	397	364	348	343	350
Fine powders	do.	634	475	568	382	400
Metallurgical e/	do.	4	2	2	2	2
Total	do.	3,869	3,191	2,958	2,672	2,752
Quartz silica sand	do.	201	169	167	71	75
Soapstone	do.	28	28	27	29	30
Sulfur:						
S content of pyrite	do.	369	350 e/	350 e/	465	400
Byproduct:	do.					
Of metallurgy	do.	227	225	225 e/	-- r/	--
Of petroleum e/	do.	40	32	32	41 2/	40
Total	do.	636	607	607 e/	506	440
Sulfuric acid e/	do.	1,300	1,320 2/	1,300	1,084	1,200
Talc	do.	361	371	399	395	400
Wollastonite		27,844	27,842	26,796	27,757	28,000
MINERAL FUELS AND RELATED MATERIALS						
Peat:						
For fuel use	thousand tons	2,308	5,103	3,945	4,000 e/	5,000
For agriculture and other uses	do.	220	355	350	550 e/	500
Petroleum refinery products e/	thousand 42-gallon barrels	72,500	73,000	76,000	80,486 2/	80,000

e/ Estimated. r/ Revised.
1/Table includes data available through May 1996.
2/ Reported figure.

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TABLE 2
FINLAND: STRUCTURE OF THE MINERAL INDUSTRY FOR 1995

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity
Ammonia		Kemira Oy (Government 98%)	Plant at Oulu	75
Cadmium, metal		Outokumpu Oy (Government 40% and Insurance Co. 12.3%)	Smelter at Kokkola	1
Cement		Partek Cement Oy (Partek Corp. 50% and Metra Corp. 50%)	Plants at Lappeenranta and Pargas	1,200
Chromite		Outokumpu Oy (Government 40% and Insurance Co. 12.3%)	Mine at Kemi	730
Copper:				
Ore, Cu content		Outokumpu Oy (Government 40% and Insurance Co. 12.3%)	Mines at Pyhäsalmi, Saattopora, and Hitura	10
Metal		Do.	Smelters at Harjavalta and Pori	160
Feldspar		Lohja Oy (Metra Corp. 100%)	Mines and plants at Haapaluoma, Kemio, and Peraseinajok	50
Ferrochrome		Outokumpu Oy (Government 40% and Insurance Co. 12.3%)	Smelter at Tornio	230
Gold:				
Ore, Au content	tons	Do.	Mines at Orivesi and Saattopora	4
Metal	do.	Do.	Smelter at Pori	4
Limestone		Partek Minerals Oy (Partek Corp. 100%)	Mines at Kolari, Lappeenranta, and Pargas	1,900
Do.		Lohja Oy (Euroc, 100%)	Mines at Mustio and Sipoo	1,650
Do.		Rauma-Repola Oy	Mine at Turnio	300
Mercury	tons	Outokumpu Oy (Government 40% and Insurance Co. 12.3%)	Smelter at Kokkola	150
Mica		Kemira Oy (Government 98%)	Mine at Siilinjarvi	10
Nickel:				
Ore, Ni content		Outokumpu Oy (Government 40% and Insurance Co. 12.3%)	Mine at Hitura	3
Metal		Do.	Smelter at Harjavalta	32
Phosphate-apatite		Kemira Oy (Government 98%)	Mine at Siilinjarvi	700
		Outokumpu Oy (Government 40% and Insurance Co. 12.3%)	Mine at Pyhäsalami	800
Quartz and quartzite		Lohja Oy (Euroc, 100%)	Mines at Kemio and Nilsia	250
Selenium	tons	Outokumpu Oy (Government 40% and Insurance Co. 12.3%)	Smelter at Pori	35
Silver	do.	Do.	Do.	30
Steel		Rautaruukki Oy (Government 68.76%)	Plant at Raahe	2,100
Do.		Fundia AB (Norsk Jenverk AS of Norway 50% and Rautaruukki 50%)	Plants at Aminnefors, Dalsbruk, and Kover	850
Do.		Ovako Oy (SKF 50%, Wartsila 25%, and Fiskas 20%)	Plant at Imatra	600
Talc		Finnminerals Oy (United Paper Mills 100%)	Mines at Lahnaslampi, Lipsavaara, Luikanlahti, and Poljivari	500
Wollastonite		Partek Minerals Oy (Partek Corp. 100%)	Mine at Lappeenranta	30
Zinc:				
Ore, Zn content		Outokumpu Oy (Government 40% and Insurance Co. 12.3%)	Mines at Pyhäsalami and Mullikkoräme	25
Metal		Do.	Smelter at Kokkola	175

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THE MINERAL INDUSTRY OF

FRANCE

By Harold R. Newman

France is one of the major European mineral producers. The traditional mineral industries in France have been in a state of transition during the past few years. In the past, the heavy involvement of the state, both economically and politically, was one of the main elements of the French mineral policy. Reduction of Government subsidies supporting uneconomic mineral operations and the depletion of mineral reserves have had a significant impact on a number of extractive operations in the French mineral industry. Efforts have been made to promote the private sector and to reduce the dependence of state-owned companies on subsidies.

In an effort to encourage exploration within the country, the mining code was modified in July 1994 by a law that established clearer, expedited rules to allocate surveying and mining licenses.

The Government was proceeding with a privatization program involving large state-controlled companies. Included among those privatized were Péchiney, Rhône-Poulenc, Société Nationale Elf Aquitaine (SNEA), Usinor-Sacilor, and Bureau de Recherches Géologiques et Minière (BRGM).

BRGM's French and international mining interests were merged with a private mining group, Normandy Poseidon of Australia, to create an international group consisting of two companies. The first, La Source Compagnie Minière, received all of BRGM's mining assets, except for gold assets in France and abroad, nickel assets in New Caledonia, and manganese assets in Gabon. The second, Compagnie Internationale Or S.A., received all of BRGM's gold assets. After the various companies changed assets, BRGM became a 9% shareholder in Normandy Poseidon.

Mineral and metal industries generally maintained their production and other activities at about the same or slightly decreased rate of 1994. Several industries, such as bauxite, coal, iron ore, and uranium, have steadily undergone changes during the past few years. Bauxite was no longer mined in France.

The coal and iron ore industries were affected by cheaper foreign sources and the depletion of domestic resources. Coal mining was directed by Charbonnages de France (CdF), a state-owned company. As a result of the high cost of underground production in comparison with cheaper imported coal, CdF was maintaining its policy of investing in high-productivity mines and closing uneconomic operations.

The uranium industry reduced its operations by closing a number of mines and processing plants owing to low market prices and depletion of certain deposits. Another factor in the drop of uranium demand was the reduced cost for petroleum and the increased accessibility of natural gas from the North Sea and the former Soviet Union. Lower petroleum prices meant that fewer new nuclear plants were considered for construction, some older plants were being closed, and the export market for uranium decreased. (*See table 1.*)

The Government maintained efforts to refocus the country's trading patterns toward the Organization for Economic Co-Operation and Development countries. Strong commercial relations continued between France and the United States, while Germany remained France's largest export destination.

Table 2 shows the relationship of selected classes of mineral commodities on France's balance of payments position in relation to the European Union (EU) and the world.

Government and private companies produced minerals and mineral products, conducted research, and explored domestically and internationally for new mineral resources. Adjustments to the single European market resulted in numerous mergers, closures of operations, and co-operative ventures as companies sought ways to obtain competitive advantages. Some industries that have benefitted greatly from Government assistance in the past were affected by a Government policy aimed at reducing assistance for nonprofitable operations. Others were expanding as Government sponsored programs resulted in exploitable opportunities, such as the availability of abundant and inexpensive electrical power. (*See table 3.*)

At a reported average cost of $1.27 per kilogram, France was considered the lowest cost aluminum-producing country in Europe. The main reasons were lower energy costs and advanced technology.

Privatization of Péchiney was completed in 1995. Transfers involved a 21% share in the Carbone Lorraine Group going to Paribas SA of Brazil, the metal package company in the United States going to Silgan Corp., the glass package company in the United States going to the Saint Gobain Group of France, and the Howmet group to

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Carlyle and Thiokol Corp. of the United States.

Société Européen d'Alliages pour la Siderurgie's (SEAS) new 110,000 tons per year (t/yr) high-carbon ferromanganese and silicomanganese plant was in operation at yearend. The plant, on a 23-hectare (ha) site in Dunkerque, was employing modern submerged-arc-furnace technology and utilizing relatively low-cost power from the nearby Graveslines nuclear power station. Most of SEAS's output was expected to be used internally in Usinor's steelmaking operations.

Gold mining in France was mostly concentrated in Société des Mines du Bourneix's operations in the Saint-Yrieix la Perche District south of Limoges and Mines et Cyanurations de Salsigne's Salsigne Mine near Carcassonne. Both companies have underground and small open pit operations with Bourneix producing about 2 t/yr of gold and Salsigne producing about 2.5 t/yr.

The famous iron ore basin of northern France stretched from Lorraine, France, northward into Belgium. However, for many years, the high phosphorus and relatively low iron content of the ore limited its desirability. Production has been declining for several years. ARBED's mine at Terres Rouges was the only working mine left and it was expected to close at yearend 1997.

The world's third largest steel manufacturer, Usinor Sacilor, was privatized in 1995. The Usinor Sacilor group was organized into three branches. The stainless steel branch, Ugine, which was composed of Imphy and Ugine of France and J&L Co. of the United States; the steel flats branch, Sollac; and the special steels branch, Aster. The Aster branch was composed of the Unimétal, Ascotmétal, Allevard, and IMS companies. Arus, the iron and steel products marketing subsidiary, was taken over by the Klockner Group.

Compagnie Française des Ferrailles (CFF), the largest independent scrap metal processor in Europe, was maintaining its investments in shredders and joint ventures. CFF had investments in 22 shredder operations, including 1 each in Spain and Belgium and 2 in the United States. Construction of four new sites was proceeding; three are in France and one is in Spain. CFF supplied about 4 million metric tons per year of ferrous scrap, which was about 40% of the total French market.

BRGM was proceeding with exploration and development of the Chessy copper deposit. Poseidon Gold, a subsidiary of Normandy Poseidon of Australia, took over Aztec Mining Ltd.'s 24% interest in the project. Production of copper ore was scheduled to begin in early 1997; the mine operation was expected to last an estimated 14 years.

Mining of lead and zinc has ceased completely in France. Two companies operated primary zinc plants in France. The company, Société des Mines et Fonderies de Zinc de la Vieille Montagne (VM), of Belgium, operated a zinc refinery at Auby-les-Douai with an annual capacity of 210,000 t/yr of zinc. VM's electrolytic plant was reportedly the newest and most modern in Europe and was built at a cost of $70 million in 1987. The other company, Métaleurop S.A., operated a 110,000 t/yr primary smelter and a 15,000 t/yr secondary smelter at Noyelles-Godualt. Métaleurop restarted operations in March 1995. The plant had ceased production in January 1994 following an accident.

Cogema, the state-owned uranium mining company, was the major producer of uranium in France. In recent years, the pace of exploration has decreased and projected future ore requirements have leveled off. In fact, most projects worldwide have been halted or canceled and several mines in France were closed. The Margnac Mine in Haute Vienne closed in 1995. La Crouzille, near Limoges, was scheduled to be closed in 1996.

France has 56 nuclear reactors producing 55,778 megawatts (MW) of electricity. Six more reactors were under construction and, when completed, would furnish an additional 8,305 MW of electricity. Nuclear power reactors provided almost 75% of electricity generated in France. About 14% of production was exported to neighboring countries.

Denain-Anzin Minéraux Refractaire Ceramique (DAMREC), a subsidiary of the Imetal Group, was the only producer of andalusite in Europe. DAMREC's mining operation is at Glomel, Brittany, and produces about 75,000 t/yr. This placed France second only to South Africa in world output of andalusite. The company produced three grades of andalusite that were distinguished by different alumina and iron oxide contents. These products were sold to the refractory and ceramic industries.

The primary barite area in France is at Chaillac in central France, near Limoges. Barytine de Chaillac, a subsidiary of Solvay Barium Strontium GmbH of Germany, is the major producer with an open pit mine and plant at Chaillac. Barytine produced about 90,000 t/yr of flotation-grade barite averaging 98% barium sulfate, suitable for chemicals production.

Lafarge SA and Société Des Ciments Français were the two largest producers of cement in France. During the past several years, these two companies have been acquiring a number of companies within France as well as internationally. Each company has gained control of approximately one-third of the domestic market, leaving fewer than eight other companies holding the remaining one-third.

Société Générale de Recherches et d'Exploitations Minières (Sogerem) controlled more than 60% of fluorspar production. The fluorspar vein deposits were found in Hercynian massifs, Massif Central, the Vosges, the axial

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zone of the Pyrénées, and the outer Alps. Sogerem's mining operations supply Comifluor S.A. which operated a plant at Bastide-a-Olette. This plant produces acid-grade fluorspar, 97% calcium fluoride, and electrical-grade fluorspar. Total production of both grades is approximately 45,000 t/yr. The Escardo Mine, owned by Denain-Anzin Minéraux, also ships approximately 90,000 t/yr from its surface mining operation to the Olette plant.

France was one of Europe's largest producers of gypsum. Two-thirds of the production was from the Paris Basin. Four companies produced approximately 95% of the output. In recent years, France had reported increased sales of gypsum products to other European countries. SA de Materiel de Construction, the largest company, accounts for almost one-half of the total gypsum produced. The largest operation was the 1.3-Mt/yr underground mine at Taverny.

Kaolin deposits derived from the granite massifs in Brittany were the most actively mined deposits in France. The largest mine, operated by Société Kaoliniere Armoricaine, was at Quessoy. The mine has a capacity of 120,000 t/yr. Another deposit in the northern area of Brittany was Plemet. In the southern part of the peninsula, at Ploemeur, are two operations, Société des Kaolin d'Arvor and Société Kaolins de Morbihan. Reportedly, these operations each have a capacity to produce 75,000 t/yr. Société des Kaolins du Finistère's 30,000 t/yr operation at Berrien was bought by Kaolins de Moribihan. The kaolin was used mostly in the paper and ceramics industries. Ball and refractory clays are mined in the Charante Basin to the southwest, which has been producing more than 1 Mt/yr.

Mines de Potasse d'Alsace S.A.(MDPA) was the principal producer of potash with two mines, Marie-Louise and Amélie, located near Mulhouse, Alsace. MDPA was the world's fifth largest supplier of potash salts. The main products were potash ore, which was concentrated to 62% potassium oxide material, bromine and other industrial products, and rock salt for snow clearing. About 90% of the potash production was used by agriculture for fertilizer and 10% was purified and treated for use in other industries.

Based on estimated reserves, the French deposit should last into the early part of the next century. However, future development was constrained to the east, west, and south by the boundaries of the tilted potash beds and to the north by the depth of the deposit. The mines were scheduled to close in 2004.

Talcs de Luzenac S.A. not only was significant to the domestic market, but also was Europe's largest corporate talc producer. The company has acquired several talc mining interests worldwide. Borax Français S.A., a subsidiary of RTZ Corp., subsequently purchased 92% of Talcs de Luzenac S.A. As a result, RTZ Corp. became one of the major talc producers in the world.

Talcs de Luzenac's open pit mine near Aix-les-Themes, where the company has been mining since 1905, was the largest operation in France. Production was about 300,000 t/yr of ore, from which more than 40 different grades of talc are derived. In terms of estimated reserves, the deposit, considered one of the largest in the world, could possibly support the current output for another 100 years.

All underground coal mines were closed in the Midi-Pyrénées region in southern France and in the Nord Pas-de-Calais basin. The state company, CdF, was proceeding with further rationalizations, resulting in reduced production. The mines at La Mure in the Alps and at Carmaux in the Massif Central were expected to close in 1997. The rest of the mines, except in Lorraine region, were expected to close between 1997 and 2000. The mines in Lorraine were expected to close after the year 2000. CdF envisioned the final stoppage of all coal mining in France by 2005.

In 1995, onshore petroleum production was mainly from the Paris Basin, which produced an estimated 10.5 million barrels (Mbbl), and the Aquitaine Basin, which produced an estimated 7 Mbbl. Because production had started to decline in these areas, the Government was planning to initiate a program to encourage exploration for new deposits in other areas thought to have good potential. The Jura Basin was one area under consideration.

Five companies were operating refineries in France: SNEA, Total, Royal Dutch/Shell Group, British Petroleum Co. PLC, and Mobil Corp. The structure of the industry was geared to gasoline production. Refining was mainly focused on high-octane unleaded gasoline used by a majority of the vehicles in France.

No refining units have been capable of processing heavy fuels, nor were there available hydrocracked feedstocks for the production of gas oil, thus leaving the process stream short on middle distillates and naphtha. France is a net importer of petroleum products.

France has a very modern and well-developed infrastructure. The French National Railways operated 34,568 kilometers (km) of 1.435-meter standard gauge, of which 11,674 km was electrified. The system incorporates the use of high-speed trains on selected tracks. Similarly, its highways are extensive and modern to transport goods and services. The inland waterways are increasingly used to transport more goods; however, they always have been significant avenues of commerce, with 6,969 km of the 14,932-km-long waterways heavily used. The major seaports are Bordeaux, Boulogne, Brest, Cherbourg, Dunkerque, Fos-sur-Mer, Le Havre, Marseille, Nantes, Rouen, Sete, and Toulon.

One of the most significant infrastructure developments in recent times has been the Channel Tunnel Project. The tunnel, constructed underneath the English Channel,

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connected Coquelles, near Calais, France, and Folkestone, England. Transportation, not only in France but also in the whole of Europe, was expected to change significantly from the operation of the Channel Tunnel. From these terminals, people drive their vehicles onto trains transporting them 49 km to the other side in about one-half hour. The Channel Tunnel connecting the two countries was expected to be a vital infrastructure component within the EU.

One of the world's most developed economies, France was an advocate for the EU and the European single-market concept. The country has had to make considerable changes in the structure of its industries, particularly those mineral industries controlled by the state. Several state-owned companies have taken the initiative to become leaders in their respective industries. Others have been forced to make additional adjustments under rationalization schemes proposed by the EU or French Government. The depletion of natural resources and/or the cessation of subsidies for uneconomic operations will have impacts on local communities and their economies. France will have the advantage of plentiful electrical power to attract industrial facilities requiring a good work force and access to significant markets in Europe.

TABLE 1
FRANCE: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity 2/		1991	1992	1993	1994	1995 e/
METALS						
Aluminum:						
Bauxite, gross weight	thousand tons	183	104	--	--	--
Alumina:						
Crude	do.	538	508	476	438	519 4/
Calcined	do.	414	391	367	344	425 4/
Metal:						
Primary	do.	286	418	426	438	372 4/
Secondary	do.	217	227	222	228	231 4/
Antimony metal, including regulus		760	1,425	848	750	680 4/
Arsenic, white e/		2,309	2,000	--	--	--
Bismuth metal		50	--	--	--	--
Cadmium metal		271	252	137	6	--
Cobalt metal:						
Powder		175	226	222	310	330 4/
Chloride		123	150	150	146	130 4/
Copper:						
Mine output, Cu content		166	149	72	174	172 4/
Metal:						
Blister, secondary e/		5,800	6,100	5,900	4,400	2,580 4/
Refined:						
Primary		19,600	27,700	21,100 r/	16,600	12,000
Secondary e/		30,000	29,000	23,300 r/	25,200	30,440
Total		49,600	56,700	44,400 r/	41,800	42,440 4/
Gold, mine output, Au content	kilograms	4,612	2,910	2,155	4,009	4,615 4/
Iron and steel:						
Iron ore and concentrates:						
Gross weight	thousand tons	7,472	5,707	3,518	2,420	1,496 4/
Fe content	do.	2,316	1,697	1,055 r/	706	432 4/
Metal:						
Pig iron	do.	13,646	13,051	12,679 r/	13,293	12,860 4/
Ferroalloys:						
Blast furnace, spiegelleisen and ferromanganese		290	280	300	294	304 4/
Electric furnace:						
Ferrochrome	do.	23	7	--	--	--
Ferromanganese	do.	30	60	57	66	99 4/
Ferrosilicon	do.	106	98	39	112	108 4/
Silicon metal	do.	64	66	59	66	71 4/
Other e/	do.	43	32	29	20	124 4/
Total e/		556	543	484	558	706 4/
Steel ingots and castings	do.	18,434	17,961	17,179	18,028	18,096 4/
Semimanufactures	do.	16,678	16,172	14,767	16,205	16,164 4/
Lead:						
Mine output, Pb content		1,725	--	--	--	--
Smelter:						
Primary		140,000	130,000	112,281	185,000	150,000
Secondary e/		30,000	25,000	25,000	--	25,000
Total e/		170,000	155,000	137,281	185,000	175,000

See footnotes at end of table.

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TABLE 1--Continued
FRANCE: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity 2/		1991	1992	1993	1994	1995 e/
METALS--Continued						
Magnesium metal, including secondary		14,050	13,660	10,982	12,280	14,450 4/
Nickel metal		7,410	6,750	9,120 r/	10,041	8,280 4/
Silver: e/						
Mine output, Ag content:						1,167 4/
Lead and zinc concentrates	kilograms	23,450	10,440	9,000	--	--
Mixed copper, gold, silver concentrates	do.	5,000	3,000	1,100	640	--
Total	do.	28,450	13,440	10,100	640	1,167 4/
Metal, Ag content of final smelter products e/	do.	20,000	14,100	12,000	921	666 4/
Tin, secondary, smelter output of solder and other alloys e/		2,400	2,000	3,439	2,700	3,020
Uranium:						
Mine output, U content		2,486	2,119	1,774	1,315	857 4/
Chemical concentrate, U3O8 equivalent		2,300	2,080	1,539	1,245	1,300 4/
Zinc:						
Mine output, Zn content		27,109	16,539	13,834	1,000	--
Metal including secondary:						
Slab		299,600	318,700	309,800	306,000	300,400 4/
Dust e/		9,000	8,000	9,000	10,000	28,000 4/
INDUSTRIAL MINERALS						
Barite		94,000	96,200	67,200	72,100	75,450 4/
Bromine, elemental e/		3,000	3,200	2,290	2,190	2,260 4/
Cement, hydraulic	thousand tons	26,507	21,165	19,320	21,296	19,692 4/
Clays:						
Bentonite e/ 4/		10,000	6,000	6,000	5,000	--
Kaolin and kaolinitic clay (marketable)	thousand tons	344	334	295	327	345 4/
Refractory clay, unspecified	do.	15	8	7	8	15
Diamonds, synthetic, industrial e/	thousand carats	4,000	3,500	3,500	3,600	3,800
Diatomite e/	thousand tons	250	85	85	90	80
Feldspar, crude e/	do.	400	282	274	390	632 4/
Fluorspar:						
Crude	do.	400	296	185	351	352 4/
Marketable:						
Acid and ceramic-grade	do.	146	118	96	105	102 4/
Metallurgical-grade	do.	50	15	20	26	28 4/
Total	do.	196	133	116	131	130
Gypsum and anhydrite, crude	do.	5,600	5,160	5,000	5,200	4,800
Kyanite, andalusite, related materials e/	do.	50	50	50	60	45
Lime, quicklime, hydrated lime, dead-burned	do.	3,000	3,000	3,000	3,015	2,940 4/
Mica e/		6,000	12,000	8,000	10,000	10,000
Nitrogen, N content of ammonia	thousand tons	1,604	1,848	1,871	1,480	1,470
Pigments, mineral, natural: Iron oxide e/		14,000	12,000	1,000	1,000	1,000
Phosphates, Thomas slag	thousand tons	538	356	300	154	140 4/
Potash:						
Gross weight (run-of-mine)	do.	9,500	8,570	8,200	6,380	6,157 4/
K2O equivalent (run-of-mine) e/	do.	1,400	1,400	1,100	936	869 4/
K2O equivalent (marketable	do.	1,129	1,141	890	870	799 4/
Pozzolan and lapilli e/	do.	400	404	526	490	427 4/
Salt:						
Rock salt e/	do.	800	103	116	143	165 4/
Brine salt (refined)	do.	1,000	1,651	1,310	1,658	1,491 4/
Marine salt	do.	1,200	1,156	1,200	1,123	1,473 4/
Salt in solution	do.	3,500	3,206	4,355	4,612	4,410 4/
Total e/	do.	6,500	6,116	6,981	7,536	7,539
Sodium compounds: e/						
Soda ash	do.	1,140	1,100	1,222	1,123	1,120 4/
Sodium sulfate	do.	93	77	62	104	117 4/
Stone, sand and gravel:						
Limestone, agricultural and industrial e/	do.	6,700	6,400	5,800	6,410	6,880 4/
Slate, roof e/	do.	50	45	26	25	27 4/
Sand and and gravel: e/						
Industrial sands, total	do.	3,500	6,300	5,400	7,240	6,100 4/
Other sand, gravel and aggregates	do.	319,240 r/	362,600 r/	333,200 r/	353,600	174,900 4/

See footnotes at end of table.

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TABLE 1--Continued
FRANCE: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity 2/		1991	1992	1993	1994	1995 e/
INDUSTRIAL MINERALS--Continued						
Sulfur, byproduct:						
Of natural gas	thousand tons	794	770	829	865 r/	825
Of petroleum	do.	225	230	278	219	240
Of unspecified sources e/	do.	180	150	150	100	100
Total e/	do.	1,199	1,150	1,257	1,184 r/	1,165
Talc:						
Crude		340,900	350,500	299,900	306,300	322,300 4/
Powder e/		280,000	260,000	225,000	277,800	297,300 4/
MINERAL FUELS AND RELATED MATERIALS						
Asphaltic material e/		43,200	39,400	40,100	38,400	32,300 4/
Carbon black e/		250,000	200,000	204,900	200,000	259,000 4/
Coal, including briquets:						
Anthracite and bituminous	thousand tons	10,128	9,478	8,676	8,040	8,210 4/
Lignite	do.	1,963	1,578	1,670	1,500	1,400 4/
Total	do.	12,091	11,056	10,346	9,540	9,610
Briquets e/	do.	500	500	500	336	276 4/
Coke, metallurgical	do.	5,315	5,362	4,752	4,504	5,770 4/
Gas, natural:						
Gross	million cubic meters	4,097	3,300	3,300	3,500	3,500
Marketed	do.	2,845	2,280	2,520	3,610	3,830
Petroleum:						
Crude	thousand 42-gallon barrels	21,240	21,913	20,039	22,823	2,830
Refinery products:						
Liquefied petroleum gas	do.	30,000	29,348 r/	31,262 r/	28,861	30,000
Gasoline, all kinds	do.	145,000	150,416 r/	149,438 r/	146,947	148,000
Jet fuel e/	do.	40,000	41,340 r/	43,672 r/	46,965 r/	45,000
Kerosene	do.	500	500	500	500	500
Distillate fuel oil	do.	210,000	200,000	200,000	200,000	200,000
Heavy fuel oil	do.	75,000	76,000	76,000	79,322 r/	78,000
Other products	do.	40,000	40,000	40,000	40,000	40,000
Refinery fuel and losses	do.	20,000	20,000	20,000	20,000	20,000
Total e/	do.	560,500	557,604 r/	560,872 r/	562,595 r/	561,500

e/ Estimated. r/ Revised.

1/ Table includes data available through Mar. 1996.

2/ In addition to the commodities listed, France also produces germanium from domestic ores and has been described as the world's leading producer of this commodity in French resources. Output was reported as being all from the Saint-Salvy Mine. Unfortunately, actual output is not regularly reported, and the ore from this mine is not sufficiently uniform in grade to permit estimates of output based on reported concentrate production. In addition France produces large quantities of stone, but statistics on output are not available.

3/ Reported number

4/ Includes smectic clay.

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TABLE 2
FRANCE: 1994 BALANCE OF PAYMENTS, SELECTED MINERAL COMMODITIES 1/

(Thousand dollars)

Mineral commodity	Exports to EU	Imports from EU	Net gain or (loss)	Exports to the world	Imports from the world	Net gain or (loss)
Crude industrial minerals:						
Feldspar	5,920	1,800	4,120	6,713	6,305	408
Magnesite	–	553	(553)	30	1,133	(1,103)
Slate	2,714	5,061	(2,347)	3,095	5,145	(2,050)
Other	452,384	396,471	55,913	614,018	677,398	(63,380)
Total	461,018	403,885	57,133	623,856	689,981	(66,125)
Metalliferous ores:						
Copper	4,459	1,996	2,463	4,480	1,996	2484
Lead	14	4,075	(4,061)	71	45,967	(45,896)
Tin	–	21	(21)	–	21	(21)
Zinc	3,336	30,746	(27,410)	3,381	152,015	(148,634)
Other (including waste and scrap)	1,046,183	490,501	555,682	1,160,211	1,357,595	(197,384)
Total	1,053,992	527,339	526,653	1,168,143	1,557,594	(389,451)
Nonmetallic mineral manufactures	260,302	495,004	(234,702)	567,942	804,190	(236,248)
Metals:						
Iron and steel	5,628,475	5,797,501	(169,026)	8,482,201	6,847,803	1,634,398
Mercury	130	130	–	227	220	7
Other nonferrous metals	2,829,521	2,688,797	140,724	3,878,263	4,947,635	(1,069,372)
Total	8,458,126	8,486,428	(28,302)	12,360,691	11,795,658	565,033
Mineral fuels	3,557,896	4,593,167	(1,035,271)	5,658,820	17,600,630	(11,941,810)

1/ Table prepared by Harold Willis, International Data Unit.

TABLE 3
FRANCE: STRUCTURE OF THE MINERAL INDUSTRY FOR 1995

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of facilities	Annual capacity
Alumina		Aluminium Péchiney (Government)	Plant at Gardanne, Bouches-du-Rhone Province	700
Aluminum		do.	Aluminum smelters at:	
Do.		do.	Saint-Jean-de-Maurienne, Savoie Province	120
Do.		do.	Noguères, Pyrénées, Atlantiques Province	115
Do.		do.	Lannemezan, Hautes-Pyrénées Province	63
Do.		do.	Auzat, Arièege Province	44
Antimony, metal		Société Nouvelle des Mines de la Lucette	Plant at Le Genest, Mayeene Province	10
Barite		Barytine de Chaillac	Mine and plant at Chaillac, Indre Province	150
Do.		Société Industrielle du Centre	Mine at Rossigno, Indre Province	100
Bauxite		Aluminium Péchiney (Government)	Mines in Var Province	900
Do.		Société Anonyme des Bauxites et	do.	400
Do.		Alumines de Province (S.A.B.A.P.)	do.	200
Cadmium	tons	Compagnie Royal Asturienne des Mines	Plant at D'Auby-les-Douai, Nord Province	200
Cement		Eight companies, of which the largest are:	80 plants, including--	23,233
Do.		Cement La Farge France	15 plants;	7,815
			Largest at St. Pierre-la-Cour	(1,160)
Do.		Société des Ciments Français	13 plants;	6,190
			Largest at Gargenville	(1,100)
Coal		Charbonnages de France (CdF) including:		13,000
Do.		Bassin de Paris	Mines and washeries in middle France	(2,500)
Do.		Bassin de Nord-Pas-de-Calais	Mines and washeries in northern France	(1,000)
Do.		Bassin de Lorraine	Mines and washeries in eastern France	(9,500)
Cobalt, metal	tons	Société Métallurgique Le Nickel (SLN)	Plant at Sandouville, near Le Havre	600
Copper, metal		Compagnie General d'Electrolyse du Palais	Electrolytic plant at Palais-sur-Vienne	45
Do.		Société Française d' Affinage du Cuivre.	Smelter at Poissy	11
Do.		Affinerie Sud-Ouest	Refinery at Toulouse	2
Feldspar		Denain-Anzin Minéraux S.A.	Mine and plant at St. Chély d' Apcher	55
Ferroalloys		Société du Ferromanganese de Paris, Outreau	Plant at Boulogne-sur-Mer	420
Do.		Péchiney Electrométallurgie (Government)	Plants at Bellegarde	387
Do.		Chromeurope S.A.	Plant at Dunkerque	25

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THE MINERAL INDUSTRY OF

GEORGIA

By Richard M. Levine

The Republic of Georgia has a diverse mineral industry, producing fuels, ferrous and nonferrous metals, ferroalloys, and industrial minerals. Georgia was a major producer of manganese from the Chiatura deposit, but reserves of high-grade ore are almost depleted. The manganese was used in Georgia for ferroalloy production at the Zestafoni ferroalloys plant. A small amount of iron ore also was mined. At the Madneuli complex in Georgia, a copper-barite polymetallic ore deposit was exploited for copper, barite, and a range of byproduct minerals, including gold and silver. Production of lead and zinc occurred at the Kvaisi lead-zinc deposit, and arsenic was mined from the Lukhumskoye and Tsanskoye deposits. Georgia has a steelworks in Rustavi with the capacity to produce 1.5 million metric tons per year (Mt/yr) of raw steel, and which also has the capacity to produce, coke, pig iron, sinter, and rolled products. Georgia produces a range of industrial minerals, including bentonite, diatomite, talc, and zeolites and semiprecious stones. Georgia also produces some coal, gas, and oil. Despite some mineral fuel production, in 1995 Georgia's largest category of imports was fossil fuels which comprised 38% of total imports.

In 1995, Georgia'a GDP was estimated to have decreased by only 5% compared with that of 1994 after having fallen by 35% in 1994, 39% in 1993, and 40% in 1992. In 1995, the Georgian Ministry for State Property Management declared that three of the country's leading mining enterprises, the Chiatura manganese complex, the Uravi mining and chemical plant that produces arsenic, and the Askaniti bentonite clay mining enterprise would be privatized and open to foreign investment.

Georgia, at the beginning of 1996, followed the example of Kazakstan in 1995 of allowing foreign firms to manage metallurgical enterprises, and signed the Zestafoni ferroalloys plant over to the Russian-Georgian Bank for Reconstruction and Development in conjunction with a U.S. partner, North Atlantic Research, to be managed for a 10-year period. The foreign managers are obligated to ensure that the plant receives the necessary raw materials, energy, and other inputs. In recent years the Zestafoni plant, which processed manganese ore from the Chiatura plant for ferroalloys production, has suffered cutbacks in both raw materials and power, resulting in ferroalloys production decreasing to only 5% to 10% of the plant's original 350,000 t/yr ferroalloys capacity.

In 1995, the Georgian State Geology Committee, Gruzgeologiya, stated that Georgia has gold reserves of 250 metric tons (t) and silver reserves of 1,500 t, with another 250 t of perspective gold reserves. Georgia was attempting to attract foreign investors to develop its gold reserves and was negotiating with Australian mineral developers to process quartzite ores from the Madneuli polymetallic mining and beneficiation complex with reportedly reserves of about 25 t of gold and more than 20 t of silver. A Government development plan calls for construction of a plant at Madneuli to recover gold from wastes and slimes with projected recovery of 2 t/yr of gold and 7 t/yr of silver.

In the 1990's Georgia's steel output fell dramatically. In 1995 crude steel production fell to 84,000 t compared with 141,000 t in 1994, 215,000 t in 1993 and 529,000 t in 1992. There had been no reported production of pig iron in Georgia since 1992.

Georgia has significant mineral deposits, but the future of its mineral industry first will depend on the country establishing political and economic stability to permit a more secure investment climate. If this stability is established, Georgia's favorable location on the Black Sea could enable it to reach world markets at reasonable cost; it already possesses supply routes to the countries of the FSU. Georgia produced manganese and ferromanganese that could have been sold on world markets. However, a large percentage of Georgia's manganese reserves of high grade oxide ores are depleted and production has declined sharply over the past decade. The development of this industry in the future will depend more on the development of carbonate ores from which it is more difficult to obtain a commercial product. Georgia also produces or has reserves of a number of metals and nonmetallic minerals that possibly could compete on world markets. It will be necessary to assess Georgia's mineral production and reserves in terms of production costs and available markets to determine the viability of Georgia's mineral industry as Georgia makes the transition to a market economy.

OTHER SOURCES OF INFORMATION

Ministry of the Economy
12, Chanturia St.

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380062, Tbilisi, Georgia
Telephone 995-32 23 -09-05/22-68-05
Fax 995-32 29-00-63
Ministry of the Environment and Natural Resources
68 A, Kostava St.
Tbilisi 380015, Georgia

Telephone 995-32-23-06-64
Fax 995-32-98-34-25 9R-347S
Ministry of Trade and Foreign Economic Relations
42 Kazbegi St.
380077 Tbilisi, Georgia
Telephone 995-32 22-51-86, Fax 995-32 39 80 82

TABLE 1
GEORGIA: STRUCTURE OF THE MINERAL INDUSTRY FOR 1995

(Metric tons unless otherwise specified)

Commodity	Major operating company	Location of main facilities	Annual capacity e/
Arsenic, mine output	Lukhumi deposit	Upper Racha region	2,000 total.
	Tsana deposit	Lower Svanetiya region	
Arsenic, metal and compounds	Racha mining and chemical plant	Racha region	NA.
	Tsana mining and chemical plant	Tsana	NA.
Barite	Chordskoye deposit	Onskiy rayon	70,000.
Bentonite	Gumbrskoye and Askanskoye deposits	Gumbra, Askana regions	200,000.
Cement	Rustavi cement plant	Rustavi	1,500,000.
Coal	Tkibuli-Shaorskoye, Tkvarchelskoye, deposits	Tkibuli, Tkvarcheli, Akhaltsikhe regions	300,000. total.
Copper, copper content of ore	Madneuli complex	Madneuli region	12,000.
Diatomite	Kisatibskoye deposit	Kisatibi region	150,000.
Ferroalloys	Zestafoni plant	Zestafoni (now Zestap'oni)	100,000 (ferromanganese).
Do.	do.	do.	250,000 (silicomanganese).
Do.	do.	do.	250,000 (manganese sintser).
Gold	Madneuli complex	Madneuli region	2.
Lead-zinc	Kvaisi deposit	Kvaisi region	1,200 (lead).
Do.	do.	do.	3,000(zinc).
Manganese, ore	Chiatura complex	Chiatura region	2,000,000.
Petroleum, crude	About 60 wells accounting for 98% of output	Mirzaani, Teleti, Supsa regions	200,000.
Steel, crude	Rustavi steel mill	Rustavi	1,500,000.

e/ Estimated. NA Not available.

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THE MINERAL INDUSTRY OF

GERMANY

By Harold R. Newman

Germany's economic development slowed in 1995 and continued to be led by exports and investment, with private consumption taking a more important role. The gross domestic product (GDP) increased by 1.9% as a whole. Because the pre-reunification and post-reunification German economies were still not entirely comparable in 1995, data for both parts were still being collected by the Statistisches Bundesamt (Federal Bureau of Statistics). Estimated German growth rates are a function of an 8% to 9% growth in eastern Germany, combined with more than 2% growth in western Germany.

Germany remains the largest economy in Europe and accounts for more than one-fourth of the European Union's (EU) GDP. Despite a rise in value of the Deutsche mark, the economy was helped by exports which rose 3.7% in 1995 in real terms. Unemployment during the year averaged about 9% for the country as a whole. The rate in western Germany averaged about 8%, while the rate in eastern Germany averaged about 13%.

Government Policies and Programs

The German Government's policies were concerned with fighting inflation, lowering unemployment, increasing the country's international competitive status, safeguarding the environment, and continuing with the incorporation of the five States of the former German Democratic Republic (GDR). The agency responsible for privatizing the former GDR state holdings, the Treuhandanstalt (Trustee Agency), ceased to exist at yearend 1994 after privatizing or closing a significant number of operations. The remaining properties were transferred to the Beteiligungs Management Gesellschaft GmbH (Interest Management Association).

The Federal Government continued to provide subsidized, long-term loans, along with new tax incentives, to encourage private investment by companies in the eastern States and it continued to send the equivalent of $100 billion per year into the eastern States in the form of subsidies and social benefits.

Germany's Constitutional Court ruled that a levy on electricity bills paid by industrial and private consumers, the Kohlepfenning (coal penny), was unconstitutional and was to be phased out by the end of 1995. The Kohlepfenning amounted to a 8.5% surcharge on electricity and was used to subsidize the steam coal industry by bridging the price gap between domestic coal and cheap imports and to guarantee jobs for miners. In 1960 the mines employed about 600,000 workers; in 1990 about 100,000 were employed.

Ending of the Kohlepfenning would coincide with the ending of another subsidy, the Jahrhundertvertrag, which obliged German electricity generators to purchase at least 40 million metric tons per year (Mt/year) of domestic coal. These two subsidies placed German electricity among the most expensive in Europe.

Part of the Constitutional Court's ruling was that any subsidy was to come out of general Government taxes. This initiated debate on whether to raise taxes beyond what had already been proposed or to end the subsidy. The Government has been subsidizing the industry with about $5 billion per year since the surcharge was introduced in 1975. Also, questions were raised as to what effect ending the subsidy and opening the hard coal industry to free market forces would have on the steel and metals industries.

Environmental Issues

Policies dealing with the environment in Germany are the responsibilities of the Minister for the Environment. With regard to mining, environmental concerns are addressed under the federal Mining Law, and its provisions for environmental impact assessment that are to be completed before mining can start. The objective of the environmental impact assessment is the identification and evaluation of all environmental consequences of a planned project, taking into account various design options, including the zero option. The environmental evaluation process in Germany, as in other countries, presents a risk for the company involved because there is no guarantee that, after completion of the assessment, usually involving considerable time and resources, the project will be approved.

Under provisions of the federal mining law, the following are required in conjunction with the assessment:

- Description of the expected environmental consequences.
- Data to support the identification and estimate of the consequences.
- Description of the preventive measures for avoidance, reduction, equalization, or substitution of the consequences.
- Data concerning the environment and its components.
- Data on alternatives to the planned project.
- Difficulties associated with gathering the necessary data.

In addition to the environmental laws and regulations enacted by the Government, individual companies and plants were committed to reduce pollution. This commitment was shown by an increase of more than 13% in total expenditures for environmental protection in 1995. The majority of funds were spent on clean air and water quality protection;

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however, expenditures on noise reduction, transport of hazardous materials, and the treatment and decontamination of polluted sites also increased.

Production

The production industry, which includes the industrial processing industry, construction industry, and mining industry, contributed 0.9% to the GDP with mining showing a -3.1%. Production in the mining and metals industries, as in other industries, depends on a variety of forces including availability of materials and supply and demand. The easing of the worldwide recession was a positive factor for these industries that depend very much on exports. The high costs of production in Germany compared with those of competing foreign producers and the problems caused by trying to balance production between the merged eastern and western States helped to constrain production. To maintain and potentially increase production and activity in the minerals and metals industry, producers and labor unions worked, in 1995, to restructure the traditional work rules that some called a restrictive factor in the expansion of the industry. (*See table 1.*)

Trade

Total value of exports of all goods for 1994, the latest year data were available, was $423 billion. The value of imports was $377 billion with France, at 11%, the major supplier. The United States, at 7.3% was fourth largest supplier. The United States had a + $6-billion trade balance with Germany. Table 2 shows a balance of payments of selected commodities.

As a major world processing nation, Germany relied on imports to feed the bulk of the metals industry, transforming the raw materials into products that supplied the manufacturing industry, which provided the bulk of the country's exported materials.

Structure of the Mineral Industry

The structure of the industry in Germany and the principal companies operating in the production and processing of metals and minerals are shown in table 3. The restructuring and privatization of the facilities in the eastern States continued in 1995. The Interest Management Association was retaining control of some of the eastern States companies until they are sold or closed. Most of the producing and processing facilities still in operation in the eastern States were small compared with those in the western States, except for lignite and potash, which were very large operations.

Commodity Review

Metals

Aluminum.—In 1995, Germany's primary aluminum industry was the largest in the EU, although it was considered medium-sized when compared with other world producers. Increased demand and increased price of aluminum resulted in an increase in production. VAW Aluminium AG accounts for more than 75% of primary aluminum production. VAW announced plans to improve its position in downstream fabrication, investing in and expanding foil production, flexible packaging, and cast and sheet products for the automobile industry. The company was proceeding with converting its primary smelter at Töging to a recycling plant. VAW stated that one of the main reasons for doing this was the high cost of shipping the alumina feed.

Lead.—Metaleurop announced it was expecting to have its new lead smelter in Nordenham on-line the first part of 1996. The old facility was closed in early December to make way for the new smelter. Because activity was halted at the old facility and output will be reduced in the startup period, the plant was expected to produce only 64,000 metric tons of refined lead in 1996 versus a normal 120,000 metric tons per year (t/yr). Full production was expected in 1997.

Metallgesellschaft AG, Frankfurt, announced it had transferred ownership of its Austrian secondary lead unit, BMG Metall und Recycling GmbH, to its metals holding company, Rheinische Zinkgesellschaft GmbH, Duisburg, as another step in the restructuring of its metals division. All the group's secondary lead plants are now grouped together, which was expected to facilitate greater cooperation between them. The metals group also includes electrolytic zinc production and zinc semifabricating operations in Germany.

Steel.—The German steel industry continued to maintain a high productivity level even though steel demand had softened and the German construction market was slowing down. Most companies were showing better financial results than had been the case in previous years. Strong demand for steel products on export markets (Asia and the United States) had a positive effect on the industry's traditional European market.

In January 1995, the Treuhandstalt negotiated the sale of 60% of the Eko Stahl AG plant in Eisenhuttenstadt to the Cockrill Sambre Group of Belgium. Eko was the largest steel plant in the former GDR. Eko was proceeding with modernization of the mill which was scheduled to be completed by yearend 1997. Modernization of the plant's cold-rolling facility was scheduled to be completed in 1996 at a cost of $79 million. Construction of a 1.4-Mt/yr blast furnace was scheduled to be completed in the first half of 1997 at a cost of $206 million, and the installation of a hot-rolling line was scheduled for completion in the second half of 1997 when a $123-million upgrade of the plant's energy and power distribution system was also to be completed. The absence of a hot-rolling line had been the main reason for the inefficiency and high operating costs of the plant. Between October 1990 and yearend 1994, the Treuhandanstalt had provided more than $840 million in subsidies to keep the

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Eko plant operating.

Industrial Minerals

Cement.—According to latest available data, domestic sales in 1994 were up by 11% over those of the previous year. Exports, including clinker, also increased substantially, up to 2.3 Mt in 1994, compared to 1.9 Mt in 1993. Imports, with a 13% increase, rose more rapidly to 7.1 Mt in 1994, compared to 6.2 Mt the previous year.

The Treuhandanstalt sold the former GDR's businessess, mostly to either German or other Western European companies, and a number of these plants were being extensively modernized. Cement demand had increased significantly; so, companies were upgrading plants for more cost-efficient production.

Clays.—There are between 140 to 160 small-to medium-sized clay mines in operation at one time in Germany. About one-half of the high-quality refractory and ceramic clays was produced in the Rhineland-Palatinate area. Production in Bavaria is concentrated in the Oberfalz area.

Bentonite was almost exclusively mined in Bavaria. Süd-Chemie AG, in Moosburg, was the largest bentonite producer in Western Europe. The second largest company was Erbslöh Geisenheim Industrie GmbH, in Geisenheim. About 30% of the bentonite production was exported for use by the drilling, construction, foundry, and water purification industries.

Most of German kaolin is mined in Bavaria. The country is the second largest producer of kaolin in Western Europe after the United Kingdom. Still, the country imports about 50% of its requirements of high-quality paper-coating-grade kaolins. Amberger Kaolinwerke GmbH was the largest producer, with mines in Hirschau, Bavaria.

Graphite.—Graphitwerk Kropfmühl AG was the only natural graphite mining and processing company in Germany. The company operated a mine and plant at Kropfmühl, Passau, and a plant at Werk Wedel, Holstein. About one-half of the company's production, which has been falling in recent years because of declining reserves, went into the European refractory industry.

Gypsum.—Germany is a major European producer of crude gypsum. The largest producer was Gebr. Knauf Westdeutsche Gipswerke GmbH which accounted for more than two-thirds of the gypsum produced. The company operated mines in Bavaria, Baden Wurttemberg, Hesse, Saarrland, and Lower Saxony. The second largest producer was Rigips Baustoffwerke GmbH, which operated mines in Baden Wurttemberg and Lower Saxony.

Magnesia.—After withdrawing from fused alumina and fused spinel production in recent years, Hüls AG announced it was to withdraw from fused magnesia production at the end of the first quarter of 1996. With a production capacity of 15,000 t/yr of fused magnesia at its Niederkassel plant, Hüls was the world's second largest supplier after Universal Ceramic Materials PLC. of the United Kingdom. Since the world electric-grade fused-magnesia supply market was about 45,000 t/yr in 1995, Hüls withdrawal took out a considerable portion of the world's capacity. The major use of fused magnesia is in ceramic insulators for heating elements.

Potash.—After the merger of all activities of Mittledeutsche Kali AG and Kali und Salz AG was completed; and Kali und Salz Beteiligungs AG, in conjunction with Beteeiligungs Management Gesellschaft Berlin GmbH, began operations, the potash industry became more settled and regained its traditional position. With a 15% share of the world's production of potash, Germany is the world's second largest producer after Canada.

Kali und Salz GmbH (K&S) concentrates on the mining operations. K&S operated seven mines and, after closings and the restructuring that were scheduled to be completed by 1997, will have a potassium chloride production capacity of 4 Mt/yr of which 2 Mt/yr will be standard grade and 2 Mt/yr will be granular grade. This capacity will be slightly more than 50% of the overall total capacity of the two separate industries prior to the merger.

Mineral Fuels

The most important energy source in Germany's consumption of primary energy is petroleum with a 40% share of total consumption. Next is natural gas with a 20% share; coal with a 15% share; lignite with 13%; nuclear with a 10% share; hydroelectricity and wind power with a 1% share each; and miscellaneous sources, such as firewood and waste, with a 1% share. About 30% of Germany's primary energy requirement was satisfied from domestic sources with the remaining 70% imported.

Anthracite and Bituminous Coal.—Subsidies that have for so long supported Western Europe's coal industry were slowly but surely being phased out. It was expected that coal producers will be operating without subsidies by the year 2000.

About 77% of hard coal production was from the Ruhr Coalfield where it is mined from seams at depths exceeding 900 meters (m). The coal ranged from anthracite to high-volatile bituminous coal. The Saar Coalfield was also important, with substantial deposits of bituminous coal. The hard coal industry was dominated by a single company, Ruhrkohle AG, which operated 14 of the existing 19 mines and preparation plants and produced about 40 Mt/yr of clean coal.

Lignite.—The lignite deposit in the Rhine region is the largest single formation in Europe. In the eastern States,

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there are major deposits at Halle Leipzig and Lower Lausitz which have considerable domestic importance.

Lignite mining, in the western States at least, was under less pressure than hard coal mining. Rheinbraun AG was Germany's major lignite producer and mined more than 100 Mt/yr. Electricity generation by the coal-fired power stations of RWE Energie accounted for 85% of Rheinbraun's production.

In the eastern States, Lausitzer Braunkohle (Laubag) was continuing to downsize in anticipation of decreased demand. Despite an unchanged 13% share of primary energy consumption, lignite output declined by 7% in 1995. Reportedly, Laubag was expecting demand to level off at around 50 Mt/yr from the current 55 Mt/yr. Lignite fueled 87% of the eastern State's power requirements and can be expected to cover at least one quarter of German electricity demand into the next century.

In an environmental move, Federal and State authorities were to pay $8 billion for one of the largest reclamation programs for the lignite mines of the eastern States. The program, started in 1991 and scheduled to end in 1997, was extended to 2002. The program calls for removal of contaminated material and reclaimation of about 10,000 hectares. This program follows the closure of the uneconomical or depleted mines of both Laubag and Mibrag.

Infrastructure

Germany had a total of 625,600 kilometers (km) of highways and roads, ranging from the high-speed Autobahn system to undeveloped gravel and packed-dirt country roads. Of the total, the Autobahn consisted of 10,814 km; national highways, 43,786 km; state highways, 99447 km; and municipal, county, and secondary roads, 471,553 km. The railroad system included 45,468 km of track, about 90% of which is Government-owned. Of the total, 44,769 km was 1.435-m standard-gauge, and 699 km was 1.000-m gauge track. Pipelines included a 3,644-km line for petroleum, 3,964-km line for refined products, and 97,564-km line for natural gas. Inland waterways and canals consisted of 7,541 km and 31 major ports, with the Kiel Canal serving as an important connection between the Baltic and North Seas and the Rhein-Main-Danube-Canal serving as a connection between the North Sea and the Black Sea. The major maritime Ports of Hamburg, Rostock, Bremerhaven, Bremen, and Wilhelmshaven together accounted for about 70% of total merchandise traffic.

Outlook

Germany's economy was expected to expand steadily for the next few years despite the huge burden of unification costs on the national economy. As growth in Germany's international trading partners increases, Germany's industrial production was expected to grow to meet the demands for consumer products. Restructuring industries to be more efficient resulted in increased unemployment, which, in turn, cut into the available resources of the Federal Government in the form of payments for unemployment compensation, retraining, and other social costs. This is expected to continue in the short term.

Major Sources of Information

Statistisches Bundesamt (Federal Statistics Office)
Gustav-Stresemann-Ring 11
65180 Wiesbaden, Germany

Bundesanstalt für Geowissenschaft und Rohstoffe
(Federal Institute for Geosciences and Natural Resources)
Stilleweg 2, Postfach 51 01 53
30361 Hannover, Germany

Bundesministerium für Forschung und Technologie
(Federal Ministry for Research and Technology)
Heinemannstrasse 2
53175 Bonn, Germany

Bundesminsiterium für Wirtschaft, Abteiling III, Energiepolitik, Mineralische Rohstoffe (Federal Ministry for Economics, Section III, Energy Policy and Mineral Raw Materials)
Villemombler Strasse 76
53100 Bonn-Duisdorf, Germany

Deutsches Institut für Wirtschaftsforschung (German Institute for Economic Research)
Köningen-Luise Strasse 5
14195 Berlin (Dahlem), Germany

Major Publications

Aussenhandel (Foreign Trade), Statistisches Bundesamt.

Der Bergbau und der Bundesrepublik Deutschland: Statistische Mitteilungen der Bergbehorden (Mining in the Federal Republic of Germany: Statistical Reports).

Bundesministerium für Wirtschaft. Jahrbuch für Bergbau, Energie, Mineralöl und Chemie (Mining, Energy, Petroleum, and Chemical Yearbook) Essen, Glückauf GmbH.

Statisches Jahrbuch für die Bundesrepublik Deutschlands, (Statistical Yearbook for the Federal Republic of Germany), Wirtschaft und Statistik (Economics and Statistics). Statistisches Bundesamt.

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TABLE 1
GERMANY: PRODUCTION OF MINERAL COMMODITIES 1/ 2/

(Metric tons unless otherwise specified)

Commodity		1991	1992	1993	1994	1995 e/
METALS						
Aluminum:						
Alumina, Al_2O_3 equivalent						
Calcined	thousand tons	863	857	840,000	824	825
Hydrate	do.	1,150	1,120	1,110	951	1,000
Metal:						
Primary		690,322	602,791	551,933	504,956	575,000
Secondary		541,644	535,551	408,120	397,900	400,000
Arsenic, white, Ar_2O_3 content e/		300	300	300	250	250
Cadmium metal, refinery including secondary		1,048	961	1,056	1,145	1,145
Cobalt metal including alloys		975	815	602	856	800
Copper:						
Metal:						
Smelter:						
Primary		186,200	179,100	141,300	237,400	242,100
Secondary		70,000	55,800 r/ e	60,000 r/ e	54,800	66,000
Refined:						
Primary		203,245	236,100	270,400 r/	252,900	247,200
Secondary		318,300	345,400	361,487	339,000	369,100
Gold, mine output, Au content	kilograms	10 e/	--	--	--	--
Iron and steel:						
Ore and concentrate:						
Gross weight		120,000	109,000	146,000 r/	145,760 e/	145,000
Fe content		16,841	15,326	23,302 r/	21,222 e/	20,000
Metal:						
Pig iron	thousand tons	30,989	28,547	26,969 r/	29,923 r/	30,000
Ferroalloys (includes speigeleisen, unspecified crude iron, and blast furnance ferromanganese with 2% or more carbon)	do.	384	237	136 r/	291 r/	280
Of which ferrochromium	do.	34	27 e/	16 r/	17 e/	16
Steel, crude		42,169	39,712	37,625 r/	40,836 r/	42,051
Semimanufactures	do.	32,881	31,553	29,840 r/	32,067 r/	32,000
Lead:						
Mine output, Pb content, recoverable		5,930	2,100	--	--	--
Metal:						
Smelter		161,000	175,000	175,000 r/	189,000	180,000
Refined:						
Primary		160,810	175,322	174,595 r/	189,435 r/	190,000
Secondary		201,700	179,000	159,561 r/	142,249	145,000
Nickel: metal, refined		850	500 r/ e	--	--	--
Platinum-group metals:						
Mine output, metal content	kilograms	1,100 e/	--	--	--	--
Metal, refined e/	do.	65,000	65,000	60,000	75,000	
Selenium metal		110	125	120	125 e/	125
Silver:						
Mine output, Ag content (recoverable)	kilograms	4,477	916	-- r/	-- r/	--
Metal, refined e/	do.	700,000	630,000	600,000	600,000	600,000
Tin:						
Mine output, Sn content		118	--	--	--	--
Metal, primary including secondary		700	200 r/ e	179 r/	100 e/	100
Uranium concentrate, U_3O_8 content		1,207	232	116 r/	50 e/	50
Zinc:						
Mine output, Zn content:						
Analytic content		54,000	14,300	--	--	--
Recoverable content		46,861	11,767	--	--	--
Metal including secondary		345,700	383,100	380,948 r/	359,900 r/	360,000
INDUSTRIAL MINERALS						
Abrasives:						
Natural, pumice		366,000	591,000	647,000	504,000	500,000
Artificial, corundum		68,500	58,600	58,931	56,601	56,000

See footnotes at end of table.

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TABLE 1--Continued
GERMANY: PRODUCTION OF MINERAL COMMODITIES 1/ 2/

(Metric tons unless otherwise specified)

Commodity		1991	1992	1993	1994	1995 e/
INDUSTRIAL MINERALS--Continued						
Barite, marketable (contained $BaSO_4$)		147,219	154,873	147,614	127,383	130,000
Boron materials, processed borax, $Na_2B_4O_7 \cdot 10H_2O$ content e/		3,000	2,000	2,000	1,500	1,500
Bromine e/		1,500	750	750	750	750
Cement:						
Clinker (intended for market)	thousand tons	1,050	1,220	1,110	1,160	1,200
Hydraulic	do.	34,400	37,529	36,649	40,380	40,000
Chalk, crude including ground	do.	600 e/	516	440	445	450
Clays:						
Bentonite	thousand tons	583	581	473 r/	475 e/	500
Bleaching and Fuller's earth	do.	708	673	670 e/	498 e/	500
Ceramic clay	do.	3,000 e/	3,120	3,290	3,540	3,500
Fire clay	do.	1,080	1,280	1,190	1,079	1,000
Kaolin, marketable	do.	684	1,185 r/	981 r/	1,631 e/	1,500
Unspecified and other	do.	761	571	888	900 e/	800
Diatomite		44,300	47,300 r/	51,700 r/	52,000 e/	50,000
Feldspar:						
Feldspar sand		65,000	50,000	50,000	50,000	50,000
Feldspar stone		10,000	10,000	10,000	10,000	10,000
Marketable, including byproduct		403,788	384,747 r/	360,154 r/	379,427 e/	375,000
Fluorspar:						
Acid-grade e/		53,500	50,000	39,000 r/	38,200 r/	38,000
Metallurgical-grade e/		7,400	3,050	997 r/	1,800 r/	1,000
Total		60,900	53,050	39,997 r/	40,000 e/	39,000
Graphite, marketable		15,807	11,963 r/	8,363 r/	4,369 e/	5,000
Gypsum and anhydrite, marketable	thousand tons	1,751	2,021 r/	3,129	3,484 r/	3,500
Lime, quicklime, dead-burned dolomite	do.	7,530	7,540	7,480	8,511	8,000
Magnesium salts (byproduct of potash mining)	do.	1,550	1,040 e/	797 r/	818	800
Nitrogen, N content of ammonia	do.	2,120	2,110	2,100	2,170	2,100
Phosphate materials:						
Phosphatic fertilizers, P_2O_5 content		736	718	730	750	750
Thomas slag:						
Gross weight	thousand tons	142	120	110	134 e/	150
P_2O_5 content		21,000	18,000 e/	16,000 r/ e	19,000 e/	19,000
Pigments, mineral, natural		7,040	10,100	7,710	7,475 e/	7,500
Potash:						
Crude, gross weight	thousand tons	41,300	37,300	30,400	34,621	34,000
Crude, K_2O content	do.	4,673	4,259	3,510	3,277	4,000
Marketable, K_2O content	do.	3,708	3,758	2,860	3,286 r/	3,000
Pumice, marketable	do.	366	591	647	504	625
Pyrite, marketable concentrate, gross weight	do.	219	53	--	--	--
Salt, marketable:						
Evaporated	do.	778	807	813	801 r/	800
Rock and other		9,923	9,559	9,772	9,731 r/	10,000
Sodium compounds, n.e.s.:						
Soda ash, manufactured	thousand tons	1,949 e/	1,639 e/	1,586	1,380	1,400
Sulfate, manufactured	do.	146	114	107	113	110
Stone, sand and gravel:						
Stone:						
Dimension, crude and partly worked	do.	177,000	178,000	198,000	200,000 e/	200,000
Dolomite	do.	1,330	914	788	800 e/	1,000
Limestone, industrial	do.	58,110	63,000	59,900	62,271	60,000
Quartz and quartzite		26,000	29,500	24,200	28,744	30,000
Slate		64,600	55,400	66,900	89,400	90,000
Sand and gravel:						
Building sand and gravel	thousand tons	188,700	211,600	213,000	244,000	250,000
Gravel including terrazzo splits	do.		169,900	172,000	201,000	200,000

See footnotes at end of table.

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TABLE 1--Continued
GERMANY: PRODUCTION OF MINERAL COMMODITIES 1/ 2/

(Metric tons unless otherwise specified)

Commodity		1991	1992	1993	1994	1995 e/
INDUSTRIAL MINERALS--Continued						
Sand:						
Foundry	thousand tons	3,350	2,760	2,400	3,240	3,000
Industrial (glass)	do.	7,664	7,943	7,370	7,600	7,500
Sulfur, byproduct:						
Of metallurgy e/		23,047	23,021	33,450	35,000 e/	30,000
Of natural gas and petroleum e/		1,079,531	1,015,853	1,137,150	1,200,000	1,200,000
Other e/		83,968	99,649	90,000	90,000 e/	90,000
Total		1,186,546	1,138,523	1,260,600	1,325,000	1,320,000
Talc and steatite		22,700	23,500	21,200	11,538 e/	15,000
MINERAL FUELS AND RELATED MATERIALS						
Asphalt and bitumen, natural		19,700	22,300	19,900	23,100	20,000
Carbon black		380,000	376,000	335,000	299,000	300,000
Coal:						
Anthracite and bituminous, marketable	thousand tons	66,438	65,906	58,283	51,985	52,000
Lignite	do.	279,401	241,751	221,748	207,131 r/	210,000
Coke:						
Of anthracite and bituminous coal	thousand tons	15,900	14,700	12,100	10,919	10,000
Of lignite	do.	862	284	186	172	175
Fuel briquets:						
Of anthracite and bituminous coal	do.	860	677	585	460	450
Of lignite (including dust and dried)	do.	24,100	16,700	9,933	6,849	6,500
Gas:						
Manufactured:						
Blast furnace	million cubic meters	4,130	4,500	4,394	4,730	4,800
Coke oven	do.	3,350	3,500	2,900	2,640	2,600
Total	do.	7,480	8,000	7,294	7,370	7,400
Natural:						
Gross		21,890	18,770	18,680	20,442 e/	20,000
Marketed e/		20,000	17,600	17,500	18,322	18,000
Peat:						
Agricultural use	thousand tons	2,880	2,720	2,740	2,950	3,000
Fuel use		225,000 e/	188,000	180,000	173,000	170,000
Petroleum:						
Crude	thousand 42-gallon barrels	24,440	23,443	22,028	21,198	22,000
Refinery products:						
Liquefied petroleum gas	do.	29,100	30,800	32,800	39,500	38,000
Gasoline including aviation	do.	211,000	215,000	214,000	225,000	225,000
Naphtha	do.	61,000	69,100	76,100	87,300	80,000
Mineral jelly and wax	do.	3,060	4,270	3,930	3,820	3,600
Kerosene and jet fuel	do.	18,200	17,800	20,600	23,000	20,000
Distillate fuel oil	do.	308,000	309,000	344,000	355,000	350,000
Refinery gas	do.	32,300 e/	34,300 r/	35,100	36,800	36,000
Lubricants	do.	4,860	5,110	4,690	4,880	4,800
Nonlubricating oils	do.	7,240	7,290	6,190	6,920	7,000
Residual fuel oil	do.	75,900	89,800	91,800	87,200	90,000
Bitumen and other residues	do.	22,000 e/	23,200 e/	23,100	25,500	25,000
Bituminous mixtures	do.	1,420	1,210	1,100	1,170	1,200
Petroleum coke	do.	8,660	8,630	8,940	9,540	9,000
Unspecified	do.	20,100	19,400	15,900	17,400	16,000
Total	do.	802,840 e/	834,910 e/	878,250	923,030	905,600

e/ Estimated. r/ Revised.
1/ Table contains data available through May 31, 1996.
2/ Data are from a combined Germany.

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TABLE 2
GERMANY: 1994 BALANCE OF PAYMENTS, SELECTED MINERAL COMMODITIES 1/

(Thousand dollars)

Mineral commodity	Exports to EU	Imports from EU	Net gain or (loss)	Exports to the world	Imports from the world	Net gain or (loss)
Crude industrial minerals:						
Chalk	1,842	18,148	(16,306)	3,287	18,261	(14,974)
Graphite, natural	4,306	48	4,258	9,387	13,397	(4,010)
Magnesite	287	1,224	(937)	607	2,255	(1,648)
Other	603,283	503,626	99,657	928,639	1,303,342	(374,703)
Total	609,718	523,046	86,672	941,920	1,337,255	(395,335)
Metalliferous ores:						
Iron ore	1,032	42	990	1,915	1,249,529	(1,247,614)
Copper	363	53,595	(53,232)	470	371,012	(370,542)
Lead	--	4,531	(4,531)	--	24,477	(24,477)
Tin	54	--	54	54	--	54
Zinc	3	3,656	(3,653)	5,957	148,745	(142,788)
Other (including waste and scrap)	1,331,935	687,507	644,428	1,931,610	2,361,284	(429,674)
Total	1,333,387	749,331	584,056	1,940,006	4,155,047	(2,215,041)
Nonmetallic mineral manufactures	718,660	802,040	(83,380)	1,347,224	1,652,341	(305,117)
Metals:						
Iron and steel	7,139,355	6,207,548	931,807	13,630,063	10,857,745	2,772,318
Mercury	164	108	56	1,655	327	1,328
Other nonferrous metals	3,905,048	3,203,675	701,373	7,124,188	8,458,761	(1,334,573)
Total	11,044,567	9,411,331	1,633,236	20,755,906	19,316,833	1,439,073
Mineral fuels	2,125,155	9,681,825	(7,556,670)	4,665,957	26,395,100	(21,729,143)

1/ Table prepared by Harold Willis, International Data Unit.

TABLE 3
GERMANY: STRUCTURE OF THE MINERAL INDUSTRY FOR 1994

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity
Alumina	VAW Aluminium AG (special aluminas)	Plant at Schwandorf	430
Do.	Aluminium Oxid Stade GmbH (VAW, 50%)	Plant at Stade	750
Do.	Martinswerke GmbH (fused alumina, Alusuisse, 100%)	Plant at Bergheim	350
Aluminum	VAW Aluminium AG	Smelters at Innwerke at Töging, Elbewerke at Stade, Rheinwerke at Neuss, Lippenwerke at Lünen (secondary)	300
Do.	Aluminium Essen GmbH	Smelter at Essen-Borbeck	95
Do.	Hamburger Aluminium-Werke GmbH (VAW, 33%)	Smelter at Hamburg	120
Cement	38 companies, the major ones are:	64 mills (grinding) including:	59,000
Do.	Heidelberger Zement AG	Plants at Blaubeuren-Schelklingen, Leimen, Hassmersheim, Burglengenfeld, Kiefersfelden, and others.	(9,200)
Do.	Dyckerhoff AG	Plants at Amoneburg, Golheim, Neuwied, Neubeckum, and others.	(7,250)
Do.	E. Schwenk, Zementwerke KG	Plants at Allmendingen, Karlstadt, and Mergelstetten	(6,000)
Do.	Anneliese Zementwerke AG	Plants at Ennigerloh-Nord, Ennigerloh-Sud, Geske, and Paderborn	(3,500)
Coal, anthracite and bituminous	Four companies:	About 27 mines, including:	72,500, including:
Do.	Ruhrkohle AG	17 mines in Ruhr region	(54,000)
Do.	Saarbergwerke AG	5 mines in Saar basin	(11,000)
Do.	Preussag Anthrazit GmbH	Mine at Ibbenbüren	(2,500)
Copper	Norddeutsche Affinerie AG (Metallgesellschaft, 35%; M.I.M. Holdings, 35%; Degussa, 30%)	Smelter and refinery, both at Hamburg	290 350
Do.	Hüttenwerke Kayser AG	Refinery at Lünen	120

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TABLE 3--Continued
GERMANY: STRUCTURE OF THE MINERAL INDUSTRY FOR 1994

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity
Lead		Metaleurop Weser Blei GmbH	Smelter and refinery at Nordenham	113 120
Do.		Berzelius Metallhütten GmbH	QSL smelter at Stolberg	75
Do.		do.	Refinery at Duisberg	120
Do.		Norddeutsche Affinerie AG	Refinery at Hamburg	50
			Fortuna/Bergheim, Zukunft/Inden, and Hambach	
Do.		Braunsweigische Kohlen-Bergwerke AG	Surface mines in Helmsted Basin: Alversdorf, Helmstedt, Schöningen, Offledben, and Buschhaus	4,500
Do.		LAUBAG (RWE Energie, PreussenElektra, Bayernwerk)	Surface mines in Lausitz Basin: Cottbus, Glückauf, Oberlausitz,Senftenburg, and Welzow	116,000
Do.		MIBRAG (Vereinigte Mitteldeutsche Braunkohlenwerke AG)	Surface mines in Bitterfeld Basin: Borna, Deuben, Geisetall, and Regis	100,000
Natural gas	million cubic meters	Brigitta Erdgas und Erdöl GmbH, and Elwerath Erdgas und Erdöl GmbH	Plants at Clenze and Grossenkmeten	9,500
Do.	do.	Mobil Erdgas-Erdöl GmbH	Plants at Scholen	4,000
Do.	do.	Other companies	Plants at Duste, Rutenbrock, and others	2,000
Petroleum:				
Crude	42-gallon barrels per day	The largest companies are:	6 areas with about 85 oilfields	80,000
Do.	do.	Elwerath Erdgas und Erdöl GmbH	West of Ems River	(30,000)
Do.	do.	Wintershall AG	Weser-Ems Rivers	(21,000)
Do.	do.	Deutsche Texaco AG	Elbe-Weser Rivers	(20,000)
Refined:	do.	About 25 companies, of which the largest:	20 refineries	2,062,000 including:
Do.	do.	Deutsche Shell AG	Refineries at Godorf, Hamburg, and Grasbroo	(256,000)
Do.	do.	Esso AG	Refineries at Karlsruhe and Ingolstadt	(245,000)
Do.	do.	Ruhr Oel AG	Refinery at Gelsenkirchen	(215,500)
Do.	do.	Erdoel Raffinerie Neustadt GmbH	Refinery at Neustadt-Donau	(145,000)
Potash		Kali und Salz AG	Mines at Bergmannssegen-Hugo, Niedersachen Riedel, Salzdetfurth, Sigmundshall, Hattorf, Neuhof-Ellers, and Wintershall	2,300 K2O
Do.		MDK (Mitteldeutsche Kali und Sondershausen)	10 mines mostly in the state of Thüringen	3,500
Salt (rock)		Kali und Salz AG	Mines at Bad Friedrichshall-Kochendorf, Braunschweig-Luneburg, Heilbronn, Riedel, Stetten, and Wesel (Borth)	15,000
Steel		Major companies including:	About 25 plants	45,000,
Do.		Thyssen Stahl AG	Plants at Krefeld, Duisburg, Hattungen Oberhausen, and Written	(13,000)
Do.		Fried. Krupp AG Hoesch-Krupp	Plants at Bochum, Dortmund, and Rheinhausen	(9,000)
Do.		Stahlwerke Peine-Salzgitter AG	Plants at Peine and Salzgitter	(4,500)
Do.		Klöckner-Werke AG	Plants at Bremen and Osnabruck	(4,200)
Zinc		Ruhr-Zink GmbH	Refinery at Datteln	200
Do.		Berzelius Metallhütten GmbH	Imperial smelter and fire refinery at Duisburg	100
Do.		Metaleurop Weser Zink GmbH	Refinery at Nordenham	130

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THE MINERAL INDUSTRY OF

GREECE

By Harold R. Newman

The metals sector of Greek industry is a small but important part of the national economy. Bauxite is the most important of Greek metal deposits, but there are also deposits of chromite, gold, iron, lead, nickel, and zinc. Aluminum is produced from domestic sources of bauxite and alumina and, therefore, is important in the domestically integrated metals sector. The steel produced is mostly from imported scrap.

The industrial minerals sector was more important in the national economy than the metals sector. The more dynamic commodities in 1995 were bentonite, magnesite, and perlite. Important export products were bentonite, magnesite, perlite, and pumice. Privatization efforts were continuing in the magnesite and refractories industries. *(See table 1.)*

Production of mineral commodities in Greece has been closely tied to the export market. As the global recession eased and prices rose, exports of commodities produced in Greece increased. Detailed trade data for Greece have not been received in the recent past, but general information indicates that the other members of the European Union (EU) have continued to strengthen their positions as the principal destinations and sources of Greek mineral exports and imports. Selected Greek companies with major equity owners are shown in table 2.

Environmental concerns are the responsibility of the Ministry of Environment, Town Planning and Public Works. Individual industrial concerns are charged with much of the responsibility of environmental protection and, in cooperation with the Government,take an active role in environmental programs. The Government's decision to import natural gas from Russia, and possibly Algeria, was based, in part, on the fact that it is much cleaner to burn than the traditional lignite.

Parnasse Bauxite Mining Co. mined bauxite mainly from Itea. Production was down from 1994 owing to decreased demand and lower prices. Delphi-Distomon S.A. reported having achieved its planned output of 859,000 t, and planned to increase production to 914,000 t in 1996. Reportedly, the company would continue with its exploration drilling program.

Interest in gold exploration continued in 1995. The joint-venture project between Barytes Ores Mining Co. S.A. of Greece and Renison Goldfields Consolidated Ltd. of Australia on the island of Milos was continuing with systematic sampling and investigation.

The Kassandra lead-zinc mines in northern Greece have produced lead, zinc, and silver for more than 30 years, but the gold mineralization in the associated pyrite has not been tapped. In late 1995, the mines were bought by TVX Hellas, an affiliate of TVX Gold Inc. TVX Hellas announced it intended to invest $200 million in 1996 to expand the mines and to construct a modern plant for gold recovery from the coproduced pyrite. However, TVX Hellas suspended operations reportedly because of environmental concerns of the local authorities regarding construction of the new plant.

Larco S.A. continued to improve its overall efficiency and to increase its production of nickel. The company announced a new $5 million investment in its facilities in 1995. This was to be expanded by an additional $10 million in 1996.

The Hellenic Mineral Mining Co. continued asbestos mining operations at the Zidani Mine. Almost all of the 75,000 t of various grades of asbestos fibers produced were exported. The fibers are suitable for mixed applications, such as asbestos cement pipes, and roofing applications.

Barytine Co. was the leading producer of industrial minerals. The company is a major producer of bentonite, kaolinite, and perlite. Also, Lava S.A. specialized in industrial minerals, with production of gypsum from Crete, pozzolan from Milos, and pumice from the volcanic island of Yali.

Grecian Magnesite S.A. was a leading producer in the European market of calcined and dead-burned magnesia. The company continued its policy of improving productivity and engaging in research and development projects. A $2 million project that involved the construction of a new crushing plant was underway. This was expected to improve magnesite recovery along with reducing costs.

Financial Mining, Industrial, and Shipping Corp. (FIMISCO) was taken over by Viomagn, a joint venture by the lignite producer Violignit and Alpha Finance, an investment bank. The former FIMISCO was a major producer of dead-burn magnesia and refractory bricks.

The Greek marble industry continued to expand in 1995. Greece's marble industry played a leading role in the international dimension stone market as a result of the marble's wide range of colors and uses. Greek marble is available in a variety of colors--white, semiwhite,

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graywhite, gray, ash, black, brown, pink, red, green, and multicolored, and is produced in almost all areas of the country.

The industry was active in three areas: the quarrying of marble blocks, the cutting of marble blocks, and the sale of the blocks and finished products. About 80% of the marble was sold as finished products; the remainder was sold in rough slab and block form.

The state-controlled Public Power Corp. (PPC) is the exclusive producer of lignite, the predominant fuel in electricity generation in Greece. PPC was continuing exploration in the basins of Amyntaion, Elasson, Florina, Megalopolis, and Ptolemais and reportedly invested about $70 million in the mining sector.

In the petroleum sector, Public Petroleum Corp opened bidding for concessions and received offers for six areas: Epirus, Aitoloakarnania, and Achaia (onshore) and south of Corfu, Patraikos Bay and Katakolon (offshore). These offers were expected to be evaluated by midyear 1996.

The railroad system in Greece, all Government owned, totaled 2,479 kilometers (km), of which 1,565 km was 1.435-meter (m) standard-gauge track, 892 km 1.000-m gauge track, 100 km of double track, and 22 km 0.750-m narrow-gauge track. The highway and road system totaled 38,938 km, of which 16,090 km was paved, 13,676 km was crushed stone and gravel, 5,632 km was improved earth, and 3,540 km was unimproved earth. The inland waterway system was 80 km, consisting of three coastal canals and three unconnected rivers. The major ports are Piraeus and Thessaloniki.

TABLE 1
GREECE: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity 2/	1991	1992	1993	1994	1995 e/
METALS					
Aluminum:					
Bauxite	2,132,716	2,078,445	2,205,498 r/	2,196,371	1,916,000
Alumina, Al2O3 equivalent	624,600	611,600	614,900 r/	548,000 e/	597,000 3/
Metal:					
Primary	150,878	150,850	146,800	144,300	140,000
Secondary e/	3,000	3,000	3,000	3,000	3,000
Chromite:					
Run-of-mine	99,384	5,000 r/ e/	3,500 r/ e/	-- r/	--
Marketable products:					
Direct-shipping ore	5,500	--	--	--	--
Concentrate	20,108	--	3,697 r/ e/	1,960 e/	--
Iron and steel:					
Iron ore and concentrate, nickeliferous, Fe content e/ 4/	815,000 3/	610,000	575,000	810,000	800,000
Metal:					
Ferroalloys:					
Ferrochromium	10,500 e/	--	--	--	--
Ferronickel e/	64,000 3/	65,000 r/	45,000	63,000	65,000
Steel, crude	980,000	924,000	980,000 r/	847,612	939,170 3/
Lead, mine output, Pb content by analysis	30,707	27,496	28,812	28,404	28,000
Manganese: e/					
Ore, crude:					
Gross weight	13,540 3/	14,677	10,000	8,600	9,000
Mn content	3,840	2,133	3,000	2,800	28,000
Concentrate:					
Gross weight	3,840 3/	3,000	2,500	2,500	2,500
Mn content	1,705 3/	2,283	1,125	900	1,000
Nickel:					
Ore:					
Gross weight	2,020,000	1,500,000	1,570,000	1,944,018	2,000,000
Ni content of nickeliferous iron ore	19,300	17,000	12,900 r/	18,821	19,947 3/
Metal, Ni content of ferronickel	16,000	15,400	10,900	16,197	17,164 3/
Silver, mine output, Ag content kilograms	80,762	63,300	55,900	60,000 e/	50,000
Tin, metal, secondary	200	200	200 e/	150 e/	150
INDUSTRIAL MINERALS					
Abrasives, natural, emery e/	7,860 3/	7,500	7,100	7,500	7,500
Asbestos:					
Ore	285,950	2,178,820	3,626,000 e/	4,647,033	4,500,000
Processed	4,780	28,592	56,940	55,502	50,000

See footnotes at end of table.

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TABLE 1–Continued
GREECE: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity 2/		1991	1992	1993	1994	1995 e/
INDUSTRIAL MINERALS–Continued						
Barite:						
Ore, crude e/		1,310 3/	1,000	1,000	1,000	1,000
Concentrate		763	907	988	701	700
Cement, hydraulic		11,800,000	10,700,000	13,925,000	13,500,000	12,000,000
Clays:						
Bentonite:						
Crude		600,286	600,083	600,000 e/	697,773	650,000
Processed		474,796	431,292	527,000 e/	583,140 e/	670,000
Kaolin:						
Crude		189,235	201,705	150,000 e/	117,254	125,000
Processed		20,318	10,993	10,000 e/	10,651	10,000
Feldspar		11,800	26,600	15,000 e/	35,000 e/	30,000
Gypsum and anhydrite		475,490	452,037	400,000 e/	453,722	450,000
Magnesite:						
Crude		506,859	471,220	500,000 e/	200,000 e/	250,000
Dead-burned		82,505	63,447	66,000 e/	77,000 e/	84,000
Caustic-calcined e/		131,000 3/	55,000	124,000	122,000	125,000
Nitrogen, N content of ammonia		210,000	140,000	57,400	55,000 e/	60,000
Perlite:						
Crude		369,495	505,348	549,000 e/	468,699	440,000
Screened		286,404	398,360	350,000 e/	371,945	360,000
Pozzolan (Santorin earth)		536,320	664,785	600,000 e/	649,608	600,000
Pumice		445,143	635,578	600,000 e/	635,470	600,000
Salt, all types e/		150,000	125,000	100,000	152,000	150,000
Silica sand e/		10,000	10,000	10,000	10,000	10,000
Sodium compounds: e/						
Carbonate		900	750	750	750	750
Sulfate		6,000	6,000	6,000	6,000	6,000
Stone, marble	cubic meters	208,687	384,840	300,000	160,181	200,000
Sulfur: e/						
S content of pyrites		35,300 3/	25,000	25,000	25,637 3/	25,000
Byproduct:						
Natural gas		125,000	120,000	100,000	56,000	50,000
Petroleum		6,000	5,000	5,000	5,000	5,000
Total sulfur		166,300	150,000	130,000	86,637	80,000
Talc and steatite: e/		790 3/	2,240	700	400	500
MINERAL FUELS AND RELATED MATERIALS						
Coal:						
Lignite		52,912,210 r/	55,089,846	54,817,000 r/	57,532,515	57,500,000
Lignite briquets		160,000 r/	122,000 r/	62,000 r/	56,000 e/	50,000
Coke, gashouse e/		16,000	15,000	15,000	13,000	14,000
Gas:						
Manufactured, gasworks e/	million cubic meters	18	18	18	15	16
Natural	do.	180	107 r/	82 r/	38	36
Natural gas plant liquids	thousand 42-gallon barrels	–	–	290 r/	360	350
Petroleum:						
Crude	thousand metric tons	849 r/	659 r/	537 r/	549	465
Refinery products:						
Liquefied petroleum gas	do.	–	4,930 r/	4,650 r/	5,450	5,500
Gasoline	do.	–	31,700 r/	29,500 r/	30,300	30,000
Naphtha	do.	–	3,430	1,230 r/	4,670	4,500
Mineral jelly and wax e/	do.	24 3/	15	15	15	15
Jet fuel	do.	11,300	10,600	10,100 r/	12,700	12,000
Kerosine	do.	39	101	78 r/	194	150
Distillate fuel oil	do.	24,300	28,200	24,300 r/	27,800	26,000
Refinery gas e/	do.	– 3/	2,100	2,100	2,100	2,000
Lubricants e/	do.	1,100 3/	800	800	1,000	1,000
Residual fuel oil	do.	36,000	35,200	29,400 r/	35,400	36,000

See footnotes at end of table.

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TABLE 1--Continued
GREECE: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity 2/		1991	1992	1993	1994	1995 e/
MINERAL FUELS AND RELATED MATERIALS--Continued						
Bitumen e/	thousand metric tons	--	1,500	1,500	1,500	1,500
Petroleum coke e/	do.	726 3/	525	525	525	500
Other e/	do.	-- 3/	400	400	400	400
Refinery fuel and losses	do.	4,400	9,210 r/	5,970 r/	5,660	6,000
Total e/	do.	5,126 3/	11,635 r/	8,395 r/	8,085	8,400

e/ Estimated. r/ Revised.
1/ Table includes data available through May 1996.
2/ In addition to the commodities listed, other crude construction materials are produced, but no basis exists for estimation of production.
3/ Reported figure.
4/ This is the iron content of the nickeliferous ore mined for its nickel content. There is no indication that this iron is recovered, except as the iron content of ferronickel.

TABLE 2
GREECE: STRUCTURE OF THE MINERAL INDUSTRY FOR 1995

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity
Alumina	Aluminium de Grèce S.A. (Pechiney of France, 60%)	Distomon, in Boeotia area	640
Aluminum	do.	do.	160
Asbestos	Asbestos Mines of Northern Greece S.A. (MAVE) (Hellenic Industrial Development Bank-Government, 95%; International Finance Corp., 5%)	Mines at Zidani, near Kozani	110
Barite	Silver and Baryte Ores Mining Co. S.A. (Eliopoulos-Kyriacopoulos Group)	Milos Island	10
Bauxite	Bauxites Parnasse Mining Co. S.A. (Eliopoulos-Kyriacopoulos Group)	Mines in Parnasse-Ghion area and Pasha, Euboea Island	2,000
Do.	Eleusis Bauxites Mines, S.A. (ELBAUMIN) (National Bank of Greece	Plant in Drama and Eleusis; mines near Drama, Itea, Kimi, and Mandra	700
Do.	Delphi-Distomon S.A.; Hellenic Bauxites of Distomin S.A.; (Aluminium de Grèce S.A.) Delphi Bauxites S.A.	Opencast mines at Delphi-Distomon area	500
Bauxite	Am. E. Barlos-Bauxite Hellas Mining S.A.	Mines at Distomon (Elixon), Beotia; Processing plant at Distomon, Beotia	300 200
Bentonite:			
Crude	Mediterranean Bentonite Co. S.A. (Industria Chemica Mineraria S.p.A., Italy)	Surface mines on Milos Island	20
Do.	Mykobar Mining Co. S.A. (MI Drilling Fluids)	Mines at Adamas, Milos Island Plants at Adamas, Milos Island	180 150
Do.	Silver and Baryte Ores Mining Co.	Mines at Adamas, Milos Island	500
Processed	do.	Plant at Voudia Bay, Milos Island	400
Cement	Halkis Cement Co. S.A.	Micro-Vathi plant, west-central Euboea	3,000
Do.	Halyps Cemnent S.A. (Ciments Français, France)	Paralia Aspropyrgos plant, Athens	800
Do.	Heracles General Cement Co. S.A. (Industrial Reconstruction Organization [IRO], 69.8%)	Plant at Milaki Plant at Volos	1,900 4,600
Do.	Titan Cement Co. S.A.	Elefsis plant, Athens area Kamari plant, Boeotia Patras plant, northern Peloponnesus Salonica plant, Salonica	400 2,600 1,900 1,650
Chromite	Financial Mining-Industrial and Shipping Corp. (FIMISCO) (IRO)	Tsingeli mines and plant near Volos	25
Ferroalloys: Ferronickel, Ni content	General Mining & Metallurgical Co. SA (LARCO) (IRO)	Larymna Metallurgical Plant	25

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TABLE 2--Continued
GREECE: STRUCTURE OF THE MINERAL INDUSTRY FOR 1995

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity
Lead, concentrate, Pb content		Hellenic Chemical Products and Fertilizer S.A. (Bodossakis Group)	Kassandra mines (Olympias; Stratoni) northeast Chalkidiki	31
Lignite		Public Power Corp. (DEH) (Government)	Aliveri mine, Euboea Island	420
			Megalopolis mine, central Peloponnesus	7,000
			Ptolemais mine, near Kozani	28,000
Magnesite, concentrate		Financial-Mining-Industrial and Shipping Corp. (FIMISCO) (Government owned - IRO)	Mines at Gerorema, Kakavos, and Paraskevorema, northern Euboea Island	350
Do.		Grecian Magnesite S.A. (operations suspended in 1992)	Mines at Yerakini and Kastri in Chalkidiki	400
Do.		Magnomin-General Mining Co. S.A. (A subsidiary of Radex Eraclit Industrie Beteiligungs GmbH, Austria)	Mines at Vavdos, Chalkidiki	68
			Processing plant at Vavdos	60
Manganese (battery-grade MnO2 concentrate)		Eleusis Bauxite Mines Mining, Industrial and Shipping S.A. (National Bank of Greece [OAE])	Nevrokopi, Drama	4
Natural gas	million cubic meters per day	Public Petroleum Corp. (DEP) (Government)	Prinos offshore gasfield and oilfield, east of Thasos Island	125
Nickel, ore		General Mining & Metallurgical Co. S.A. (LARCO) (IRO)	Agios Ioannis mines near Larymna	500
			Mines at Euboea	
Perlite		Silver and Baryte Ores Mining Co. S.A.	Kos and Milos Islands	250
			Plant at Pireaus	300
Do.		Otavi Minen Hellas S.A. (Otavi Minen AG, Germany)	Milos Island	120
Do.		Peletico Hellas S.A. (Peletico Ltd. of Cyprus)	do.	20
Do.		N. Bournas & Co.	Kos Island	75
Petroleum, refine	42-gallon barrels per day	Hellenic Aspropyrgos Refinery S.A.	Aspropyrgos	95,000
Do.	do.	Motor Oil (Hellas) Corinth Refineries S.A.	Aghii Theodori, Corinth	140,000
Do.	do.	Petrola Hellas S.A.	Eleusis	100,000
Do.	do.	Thessaloniki Refining Co. A.E.	Thessaloniki	76,000
Pozzolan (Santorin earth)		Lava Mining & Quarrying Co. Ltd. (Heracles General Cement Co. S.A.)	Quarries on Ghyali Island	800
Steel, crude		Halyvourgia Thessalias S.A. (A subsidiary of Manessis Bros. and Voyatzis S.A. (65%); the balance, 35%, owned by state-owned National Investment Bank for Industrial Development - NIBID)	Steelworks at Volos (operates two 35-ton electric arc furnaces)	1,500
				300
				200
Do.		Halyvourgiki, Inc.	Steelworks at Eleusis (three 100-ton electric arc furnaces)	1,200
Do.		Helleniki Halivourgia S.A.	Steelworks at Aspropyrgos (two 55-ton electric furnaces)	400
Do.		Sidenor S.A. (also known as Halivorgia Voviou Ellados S.A.)	Steelworks at Nea Maguisia, near Thessaloniki (two 55-ton and two 30-ton electric arc furnaces)	350
Zinc, concentrate, Zn content		Hellenic Chemical Products and Fertilizer Co. (Bodossakis Group)	Kassandra mines (Olympias, Stratoni), northeast Chalkidiki	25

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TABLE 3
GREECE: RESERVES OF SELECTED MINERAL COMMODITIES 1/
FOR 1994

(Million metric tons unless otherwise specified)

Commodity		Reserves
Asbestos		4
Barite		4
Bauxite		750
Chromite		16
Gas, natural	billion cubic meters	8
Iron		70
Lead, content of ore		.7
Lignite		3,570
Magnesite		50
Manganese, content of ore		2
Nickel, content of ore		3
Petroleum, crude	thousand barrels	41,000
Perlite		200
Pyrite		6
Zinc, content of ore		1.3

1/ Measured and inferred reserves.

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THE MINERAL INDUSTRY OF

HUNGARY

By Walter G. Steblez

Bauxite was the only major nonfuel mineral produced in Hungary that was significant in terms of European mineral production. In 1995, Hungary continued to produce modest amounts of fossil fuels, industrial minerals, and metals. However, the country's production of primary aluminum had almost ceased, owing to Hungary's energy shortages. Coal, natural gas, and petroleum also were produced, but in amounts sufficient to satisfy only about one-half of the country's annual energy needs. Hungary's transition from central economic planning to a market-based economic system continued to require corresponding structural changes in the economy. Among the major changes in this transition process was the gradual severance of state subsidies to industries and other commercial enterprises. Hungary's minerals industries increasingly had to rely on markets for continued operations and also have rising levels of unemployment, declines of production, and possible bankruptcy.

In 1995, Hungary's real GDP was expected to increase by about 2% compared with that of 1994.[10] In 1994, the GDP of Hungary grew by more than 2%, following several years of economic dislocation resulting from structural economic changes and the reorientation of country's foreign trade. The chief events in the Hungary's minerals industries in 1995 included further gold exploration work at Recsk, the announced closure of the Mecsek uranium mine, and the renewal of the Hungarian-Russian alumina for aluminum agreement.

The Government of Hungary remained committed to the process of restructuring and denationalizing its state-owned industrial assets. By 1995, about 60% of Hungary's GDP was composed of private sector activity. Moreover, the Government planned to accelerate the privatization of the country's state-owned enterprises. According to the new law on privatization, the Government planned to decouple all branches of the mineral industry from state control including those of strategic importance to the country, such as the Hungarian Oil and Gas Co. (MOL) and the Mecsek Ore Mining Co., Hungary's uranium ore mining and processing firm.[2/] The Hungarian Government's Decree No. 132/1993, constituted the country's latest Mining Law (section 50. of Act XLVIII, 1993), which, among many functions, established the legislative basis for the "estimation of national mineral reserves, (the) determination of environmental and other risks of exploitation; (provision of) geological and geophysical data supply and recommendation for mineral exploration, aimed at the selection of areas suitable for concession; (the) supply of geological data packages for concession tenders; (and the) provision of other geological, hydrogeologic, geotechnical, environmental, and mining information to outline tender conditions."

The overall neglect of the environment by Hungary's former Government from 1948 to 1989 resulted in considerable degradation of the country's air, and, in some cases, ground and surface waters from industrial point sources, such as chemical plants, mines, steel mills, and refineries. The use of high-sulfur brown coals and lignites at the country's thermal electric power stations heavily contributed to high concentrations of sulfur dioxide, nitrous oxide, and suspended solid particulates. The draft of the new environmental protection law, titled, "The Basic Laws on the Environment," reportedly was to establish regulations on environmental protection, conservation, and regional development. Government agencies that have been responsible for enforcing existing regulations concerning environmental protection included the Ministry of the Environment and Regional Planning (KTM) and the Hungarian Mining Office (MBH). KTM was authorized to help only in the enforcement of existing environmental protection legislation prescribed by other ministries of the Government. With respect to mining and minerals, Hungary's Ministry of Industry and Commerce had the primary responsibility for establishing environmental regulatory standards. The chief responsibility of MBH was that of a certifying agency. Reportedly, MBH could review only technical developmental and operational plans, which had to include provisions concerning environmental protection and land restoration by responsible entities, and oversee their compliance.

Hungary's generally declining trend in minerals output after 1989 largely was the result of structural adjustments during the emergence of a market-based economic system. From 1993 to 1995, the country's commodity production trends have been showing a growing correspondence to market demand as opposed to industrial output during the period of central economic planning, when production targets were set without reference to costs, efficiency, and other economic variables. (*See table 1.*) Consequently, stabilization of output of most minerals became evident in 1993-95. Similarly, Hungary's mineral resources are being evaluated and reexamined with reference to market

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criteria. Reserves, as defined by most market economies, are those mineral deposits that can be mined at a profit under existing conditions with existing technology. In CMEA countries, including Hungary, the previous policies for centrally planned industrial development often had more to do with political rather than economic considerations. The chief principle of industrial development was to attain self-sufficiency at all costs. Centrally planned directives to discover exploitable resources may have resulted in possible over evaluations of collected field data. Consequently, it could take Hungary a number of years to determine its real mineral reserves from the standpoint of a market economy. The information provided in table 2 lists the names of administrative bodies as well as subordinate production units of the main branches of the country's mineral industry. *(See table 2.)*

The republics of the former Soviet Union (FSU) remained Hungary's major mineral trading partners. In 1993, for which more complete trade returns were available, the FSU continued to supply Hungary with almost 100% of its import needs of natural gas and petroleum. Additionally, in 1993, of Hungary's imports of coal (all grades), iron ore, pig iron, ferromanganese, and ferrosilicon from the FSU amounted to 33%, 92%, 37%, 49%, and 58% of total imports of these commodities, respectively. However, the overall volume (and value) of the country's foreign trade had shifted from its former centrally planned economy partners of the CMEA to the industrial countries of Western Europe.[3]

The most important event concerning Hungary's bauxite, alumina, and aluminum industries in 1995 was the renewal of a long-standing alumina for aluminum agreement between Hungary and Russia. When the CMEA was a viable entity, this was a long-term agreement between Hungary and the Soviet Union and was the basis for Hungary's bauxite mining and alumina refining operations. Following the dissolution of the CMEA, the transactions between Hungary and the Soviet Union and later Russia were conducted on a spot market basis, which resulted in greatly reduced procurement offerings to Hungary. Because of this, and also because of the uneconomic position of Hungary's domestic ore, compared with bauxite available on the world market, a significant rationalization process had occurred in the industry. In 1994, the alumina wet section at the Almasfuzito alumina refinery was reported closed. The final decision to close the facility was made following the loss of a tender to provide alumina to the new alumina smelter at Ziar nad Hronom in nearby Slovakia. The closure represented a decrease in the country's alumina refining capacity by 300,000 t/yr.[4] Moreover, the Csabpuszta bauxite mine, which has provided Almasfuzito with feedstock, was to close in mid-1995, leaving Hungary with four operting bauxite mines.

In June, an agreement was concluded between Hungary and Russia that was to provide Russia with about 100,000 t of alumina in 1996 on the basis of terms that were not disclosed at the time.[5] Compared with that of 1995, the agreement would increase Hungary's alumina shipments to Russia by about 40,000 mt.[6] Reportedly, Russia indicated that it may consider negotiating a longer-term supply arrangement to the year 2000 to lock in favorable prices.[7] Under the current contract, smelter grade alumina to be shipped to Russia would be produced at the Ajka refinery. However, should Russia increase its alumina purchases through the year 2000, Hungalu could reopen the Almasfuzito alumina refinery. In late 1994, Hungalu decided to retain the Inota aluminum smelter, which has been operating at about its full capacity of 30,000 t/yr.[8] In late 1995, Hungalu decided to privatize Magyarovar Alumina and Alundum Ltd. (MOTIM), its refractory grade alumina and refractories manufacturer. About 90% of MOTIM's stock was to be offered for bidding and 10% to MOTIM's employees.[9] Located at Masonmagyarovar, MOTIM produces about 75,000 t/yr of calcined alumina, using the Bayer process. Production capacities at MOTIM are 30,000 t/yr for fused alumina; 7,000 t/yr for fused cast alumina (refractories and abrasives); 10,000 t/yr for fused mullite (glass and steel industry); 1,000 t/yr for fused magnesium-alumina spinel (refractory bricks and monolithics). Additionally, MOTIM's chemical division produces hydrated alumina that is consumed by the the company's 60,000-t/yr aluminum sulfate plant.

Hungary continued to maintain facilities at the Recsk copper deposit, despite failure in recent years to find sufficient capital to develop the site. Mining at Recsk began in 1926 when mineralization relatively close to the surface was exploited to produce copper and gold. Mining ceased in 1979, following the depletion of reserves of ore. Subsequent geologic investigations at Recsk have revealed very large, deep-lying copper and polymetallic mineralization in a 10-square-kilometer area. Mineral resources at Recsk were determined at about 175 Mt of copper ore, grading about 1.1% copper, and 20 Mt of polymetallic ore, grading about 4.2% lead and 0.9% zinc, together with smaller quantities of gold, molybdenum, and silver.

Apart from care and maintenance operations at Recsk, in late 1994, a reexploration and reevaluation of the copper-gold ore body at Recsk, near the old Lahoca Mine was undertaken by a joint venture of the same name consisting of Rhodes Mining of Australia and the Hungarian state property agency, AV Rt. The operations at the Lahoca project reportedly were managed by Enargit Kft., which was owned by Rhodes Mining and AV Rt., owning 81.6% and 18.4% of the shares, respectively.[10] The Lahoca mine was operational from 1850 to 1979, producing copper and gold with ore grading 3 g/t. Reportedly, the work conducted in 1994 included the drilling of 37 surface drill holes at 100-m spacings. At a cut off grade of 1 g/t of ore, the deposit was determined to contain about 26,784

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kilograms of gold.[11] In early 1995, AV Rt. sold its minority stake in Enargit Kft. to Rhodes Mining.[12] Additionally, an agreement was concluded between two wholly owned subsidiaries of Rhodes (Enargit Kft. and Swan Resources Ltd.) and Billiton Development BV of the Netherlands, which allowed Billiton the option to acquire up to 50% of the Lahoca gold mining project. At yearend, it was reported that Rhodes Mining had hired the Canadian mining company, CAMECO, to conduct an engineering study on the best method to mine the deposit.[13]

Among the chief events in the iron and steel sector was the renationalization of the Dimag-Diosgyoer Stock Corp., reportedly effective in February. The company reportedly will continue to operate under the name Diosgyoer Steel Plant Ltd. The continued operation of this enterprise would maintain employment for about 3,000 workers and have the capacity to produce about 550,000 t/yr of crude steel.[14]

Most industrial minerals in Hungary, apart from cement, were produced under the auspices of the Hungarian Ore and Mineral Co., a partially denationalized state-owned enterprise. Major industrial minerals mined in Hungary included bentonite, diatomite, dolomite, kaolin, manganese (nonmetallurgical), perlite, silica sand, and zeolite. The production of these commodities satisfied both the country's domestic and export requirements. Hungary's export trade in industrial minerals was handled by Mineralimpex (Hungarian Trading Co. for Oils and Mining Products) with offices in Austria, Germany, and Switzerland.

Hungary's industrial minerals sector also had the most success with respect to restructuring and attracting foreign investment capital. By yearend 1994, a substantial portion of the country's cement industry was capitalized through foreign investment, largely from Germany and Switzerland. Reportedly, each plant in Hungary's cement industry has been able to acquire foreign investment during the 1990's. Domestic capacity was reported to be about 5.25 Mt/yr; the capacity of clinker was 4.4 Mt/yr.[15] Heidelberger and Schwenk of Germany owned 90% of the Dunai Cement factory and, respectively, 34% and 16% of the stock of the Beremend and Belapatfalva cement plants. Holderbank of Switzerland acquired a 50%, 33%, and 16% share of the stock of Labatlan, Hejoscaba, and Belapatfalva cement plants, respectively. In recent year, most production of cement was destined for domestic markets, and a small amount was exported (116,000 mt in 1994) with exports to Romania, Slovakia, and Ukraine composing about 85% of total exports.[16]

In early 1995, the Government of Hungary decided to close the Mecsek uranium mine by 1997, following 7 years of financial losses at this facility. Uranium needed for the country's Paks nuclear power plant was to be imported.[17] Other developments in the mineral fuels sector in 1995 involved the final stages of negotiation of contracts by the Government of Hungary with private oil companies to conduct exploration in Hungary.[18]

The country's pipeline network consisted of a 1,204-km line to carry crude oil, a 600-km line for refinery products, and a 3,800-km pipeline for natural gas. In 1992, mineral fuels carried by the country's pipelines constituted 80.8% of total carriage by pipeline.

The total net installed electric generating capacity as of 1990 amounted to 6,891 megawatts (MW), of which 4,946 MW was rated by thermal electric generating plants, 1,695 MW by nuclear powerplants, 48 MW by hydroelectric power facilities, and 202 MW by.

Given the Hungarian Government's objective to bring the country into conformity with standards that are current within European Free Trade Union and the EU, greater investment can be envisaged for the reconstruction and modernization of the country's infrastructure: transportation networks, commercial buildings, and private and publicly owned dwellings, etc. To accommodate most of these objectives, the country's industrial minerals and construction materials sectors would increase in importance as the demand for cement, quarry products, and other industrial minerals increases.

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[1]Economic Trends and Outlook for Hungary, 1995, U.S. Dept. of Commerce.
[2]FBIS-EEU-94-111-S, June 9, 1995, pp. 1-35; from Magyar Kozlony, May 17, 1995, No. 38, pp. 1792-1811, and Government of the Hungarian Republic Nov. 11, 1994, pp. 3-25.
[3] Kulkereskedelmi Statisztikai Evkonyv (Statistical Yearbook of External Trade, 1993), (Budapest), 1994, pp. 81-129.
[4] Mining Journal (London), Nov. 4, 1994, p. 322.
[5] ___. June 9, 1995, p. 422.
[6] American Metal Market, June 7, 1995, p. 16.
[7] Mining Journal (London), June 9, 1995, p. 422.
[8] ___. Dec. 9. 1994, p. 422.
[9] Industrial Minerals, Nov. 1995, p. 24.
[10] Mining Magazine (London), Oct. 1994, p. 231.
[11] ___. July, 1995, p. 50.
[12] American Metal Market, Jan. 12, 1995, p. 2.
[13] FBIS-EEU-95-242-S, Dec. 18, 1995, p. 8; from MTI (Budapest) 1918 GMT, Dec. 13, 1995.
[14] SWB EEW/0369 p. WA/3, Feb. 2, 1995; from Hungarian radio 1700 gmt, Jan. 27, 1995.
[15] International Cement Review, Jan. 1994, p. 15.
[16] ___. May 1995, p. 47.
[17] Mining Journal, Jan. 13, 1995, p. 27.
[18] Journal of Commerce, July 20, 1995, p. 3B.

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TABLE 1
HUNGARY: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity 2/		1991	1992	1993	1994	1995 e/
METALS						
Aluminum:						
Bauxite, gross weight	thousand tons	2,040	1,720	1,560	830	1,100
Alumina, gross weight, calcined basis	do.	653	548 r/	421	177 r/	230
Metal:						
Primary		63,300	26,865 r/	27,879 r/	30,740 r/	25,000
Secondary e/		32,000	20,000	25,000	3,000	4,000
Total e/		95,300 r/	46,865 r/	52,879 r/	33,740 r/	29,000
Copper, metal: e/						
Smelter, secondary		100	100	100	100	100
Refined including secondary		12,000	12,000	11,000	11,000	11,000
Gallium, metal e/	kilograms	3,600	3,500	2,500	-- 3/	--
Iron and steel, metal:						
Pig iron:						
For steel industry	thousand tons	1,310	1,176 r/	1,407 r/	1,590	1,600
For foundry use	do.	4	--	--	--	--
Total	do.	1,314 r/	1,176 r/	1,407 r/	1,590	1,600
Ferroalloys e/ 4/		8,500	8,500	8,500	8,000	8,000
Steel:						
Crude	thousand tons	1,930	1,559 r/	1,752 r/	1,945 r/	1,850
Semimanufactures, rolled only	do.	1,540	1,670	1,835 r/	2,073 r/	2,000
Manganese ore:						
Run of mine:						
Gross weight		54,800	32,000	38,000	40,000	40,000
Mn content e/		10,000	5,800	6,800	7,200	7,200
Concentrate:						
Gross weight		30,000	18,000	59,000	25,000	25,000
Mn content e/		9,300	5,400	17,500	7,500	7,500
Vanadium, metal e/		200	200	200	200	200
Zinc, metal, smelter, secondary e/		1,200	1,000	1,000	-- 3/	--
INDUSTRIAL MINERALS						
Cement, hydraulic	thousand tons	2,530	2,240	2,530	2,810	3,000
Clays:						
Bentonite:						
Raw		18,100	23,000	9,404 r/	14,700	15,000
Processed		14,100	15,000	8,000 r/ e/	12,000	12,000
Kaolin, raw and washed		19,000	7,000	15,000	15,000	15,000
Gypsum and anhydrite e/		110,000	50,000	22,000 3/	25,000	25,000
Lime, calcined	thousand tons	571	507	476	464	480
Nitrogen, N content of ammonia	do.	261	152	237	250	250
Perlite		87,800	83,000	80,000	85,000	85,000
Refractory materials, n.e.s.:						
Chamotte products	thousand tons	28	19	20	20	20
Chrome magnesite products	do.	9	41	3	5	5
Sand and gravel:						
Gravel	thousand cubic meters	2,970	3,790	3,170	3,000	300
Sand:						
Common e/	do.	200	200	200	200	200
Foundry	do.	181	184	15	12	15
Glass	do.	600	660	260	308	300
Sodium compounds:						
Hydroxide (caustic soda)		170,000	139,000	130,000	132,000	155,000
Sulfate e/		6,000	6,000	6,000	6,000	5,000
Stone:						
Dimension, all types	thousand tons	3,350	3,650	4,030	4,000	4,000
Dolomite	do.	454	298	644	600	600
Limestone	do.	4,330	3,700 r/	3,920 r/	4,000	4,000
Quartzite	do.	1 r/	-- r/	-- r/	--	--
Sulfur: e/						
From pyrite		900	900	800	800	800
Byproduct, elemental, all sources		8,000	8,000	8,000	8,000	8,000
Total		8,900	8,900	8,800	8,800	8,800
Sulfuric acid		134,000	94,900	71,300	83,700	100,000
Talc e/		10,000	10,000	10,000	10,000	10,000

See footnotes at end of table.

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TABLE 1--Continued
HUNGARY: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity 2/		1991	1992	1993	1994	1995 e/
MINERAL FUELS AND RELATED MATERIALS						
Coal:						
Bituminous	thousand tons	1,700	1,274	942	1,024	1,000
Brown	do.	9,950	7,630	6,600	5,710	6,500
Lignite	do.	5,330	7,020	5,050	6,760	7,000
Total	do.	16,980	15,924 r/	12,592	13,494 r/	14,500
Coke, metallurgical		611	719	643	650	650
Fuel briquets	thousand tons	1,920	682	605	410	400
Gas, natural, marketed	million cubic meters	5,040	5,060	5,010	5,900	5,300
Peat, agricultural use e/	thousand tons	65	65	65	65	65
Petroleum:						
Crude:						
As reported	do.	1,890	1,830	1,710	1,600	1,650
Converted	thousand 42-gallon barrels	12,700	12,200	11,400	10,700	10,800
Refinery products 5/	do.	45,700	45,700	41,200	41,000	41,000

e/ Estimated. r/ Revised.

1/ Table includes data available through Apr.. 1996.

2/ In addition to the commodities listed, diatomite and a variety of other crude construction materials such as common clays are produced, but available information is inadequate to make reliable estimates of output levels.

3/ Reported figure.

4/ Hungary is believed to produce some blast furnace ferromanganese.

5/ Excludes refinery fuel and losses.

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TABLE 2
HUNGARY: STRUCTURE OF THE MINERAL INDUSTRY FOR 1995

(Thousand of metric tons unless otherwise specified)

Commodity		Major operating companies	Location of main facilities	Annual capacity
Alumina		HUNGALU (Hungarian Aluminum Corp.	Ajka Timfoldgyar plant, about 120 kilometers southwest of Budapest, near Lake Balaton	450
Do.		do.	Almasfuzito Timfoldgyar plant near the Czech Republic border, 63 kilometers northwest of Budapest	350
Do.		do.	Moson-Magyarovar plant, in northwest corner of Hungary, about 12 kilometers from Austrian and Czechoslavak border	75
Aluminum, primary		do.	Inota plant, near Varpalota, 75 kilometers southwest of Budapest	46
Bauxite		HUNGALU: Bakony Mining Enterprise	Bakony District, extending roughly 100 kilometers northeast along Lake Balaton	1,500
Do.		Fejer County Mining Enterprise	Fejer County, Vertes District, about 60 kilometers south of Budapest	1,060
Cement		Cement es Meszmuvek	Belapatfalva, near Miskolc, 125 kilometers northeast of Budapest	1,200
Do.		do.	Beremend, 45 kilometers south of Pecs	1,100
Do.		do.	Hejocsaba, 150 kilometers northeast of Budapest	1,600
Do.		do.	Labatlan, 20 kilometers north of Tatabanya	500
Do.		do.	Selyp, 50 kilometers north of Budapest	60
Do.		do.	Tatabanya, 80 kilometers west of Budapest	500
Do.		do.	Vac, 50 kilometers north of Budapest	1,200
Coal:				
Bituminous and lignite		Magyar Szenbanyaszati Troszt (MSZT) (Hungarian Coal Mining Trust)	Tatabanya and Oroszlany coal mining region, 45 kilometers west of Budapest	8,900
Do.		do.	Mecsek coal mining region, near Pecs and Komlo, north of the Yugoslav border	3,100
Do.		do.	Borsod coal mining region, 130 kilometers northeast of Budapest	5,200
Lignite		do.	Thorez opencast mine at Visonta, 80 kilometers northeast of Budapest	7,000
Manganese		Orszagos Erc-es Asvanybanyak (National Ore & Mineral Mines)	Urkut manganese ore mines, 120 kilometers southwest of Budapest	160
Natural gas	million cubic feet	Hungarian Oil and Gas Co. (MOL)	Szeged and Algyo gasfields, southern Hungary	152,000
Do.		do.	Hajduszoboszo gasfields, 180 kilometers east of Budapest	50,000
Do.		do.	Smaller gasfields: Szank, Kardoskut, Bekes, Berefurdo, and others	39,000
Petroleum:				
Crude	million barrels	do.	Szeged-Algyo field, near Romanian-Yugoslav border; 50% of total capacity	7
Refined:		Subsidiaries of MOL:		
Do.	do.	Danube Petroleum Refining Co.	Szazhalombatta	55
Do.	do.	Tisza Petroleum Refining Co.	Leninavaros	22
Do.	do.	Zala Petroleum Refining Co.	Zalaegerszeg	4
Steel		Dunai Vasmu (Danube Steel Works)	60 kilometers south of Budapest	1,400
Do.		Ostag - Ozdi Acelmu Rt	120 kilometers northeast of Budapest	700
Do.		Dimag - Diosgyoer Stock Corp.	Diosgyoer, 145 kilometers northeast of Budapest	954
Do.		Cepel Iron and Steel Works	Budapest	171

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THE MINERAL INDUSTRY OF

ICELAND

By Harold R. Newman

TABLE 1
ICELAND: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity		1991	1992	1993	1994	1995 e/
Aluminum metal, primary 2/		89,100	89,500	94,500 r/	99,294	100,000
Cement, hydraulic 3/		106,174	99,803	85,531 r/	80,856	81,514 4/
Diatomite		23,100	19,900	18,000 r/ e/	24,566 e/	24,000
Ferrosilicon		50,300	51,700	67,400 r/	66,003	66,000
Nitrogen, N content of ammonia		8,920	8,710	8,700 e/	8,966 e/	8,800
Pumice and related volcanic material:						
Pumice		33,400	33,500	45,000 r/ e/	23,000 e/	30,000
Scoria		389	462	500 e/	500 e/	500
Salt e/		3,000	4,210 4/	4,500	4,500	4,000
Sand:						
Basaltic	cubic meters	50	–	–	300	300
Calcareous, shell	do.	106,000	85,800	81,300 r/	81,451	82,000
Sand and gravel	thousand cubic meters	3,660	3,660	3,600 e/	3,600 e/	3,600
Silica dust 5/		10,700	10,200	10,000 e/	13,871 e/	14,000
Stone, crushed:						
Basaltic		117,000	109,000	100,000 e/	114,000 e/	110,000
Rhyolite	cubic meters	23,000	18,200	16,500 r/	16,552	16,000

e/ Estimated. r/ Revised.
1/ Table includes data available through Mar. 1996.
2/ Ingot and rolling billet production.
3/ Sales.
4/ Reported figure.
5/ Byproduct of ferrosilicon.

TABLE 2
ICELAND: STRUCTURE OF THE MINERAL INDUSTRY FOR 1995

(Thousand metric tons)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity
Aluminum	ISAL (Alusuisse-Lonza Holding Ltd 100%)	Straumsvik	100
Cement	Sementsverksmidja Rikisins (Government 100%)	Akranes	115
Diatomite	Kisilidjan hf (Government 98%)	Myvatnssveit	27
Fertilizer	Aburdarverksmidja Rikisins (Government 100%)	Gufunes	60
Ferrosilicon	Islenska jarnblendifelagid hf (Government 55% and Elkem A/S 30%)	Plant at Grundartangi	72
Pumice	Eldber hf (Jardenfnaidnadur hf 51%)	Mount Hekla	210
Do.	Pumice Products Ltd (BM Valla Ltd 100%)	do.	32
Salt	Icelandic Salt Co (Akzo NV of Netherlands 58%)	Plant at Svartsengi	5

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THE MINERAL INDUSTRY OF

IRELAND

By Harold R. Newman

Ireland remained as one of Europe's major producers of zinc and a significant producer of alumina, lead, and peat in 1995. The country continued its significance in the European Union as a producer of mined lead and zinc. Although the range of minerals exploited in the country has been limited, exploration activity continued to increase, mainly emphasizing gold, lead, and zinc. The country's mineral processing industry was relatively small, as was the demand and consumption of mineral resources.

Ireland's base-metals production, centered mainly on Outokumpu Oy's Tara zinc-lead mine near Navan, County Meath, remained consistent along with industrial mineral production, including barite and gypsum. Several metals and industrial minerals projects were awaiting the granting of planning permission and mining leases before moving into development and production. Natural gas production continued off the southern coast of Ireland, near Cork. Reserves were not disclosed, and production from the fields was being carefully managed to extend the life of the area. (*See table 1.*)

The Geological Survey of Ireland (GSI) was responsible for the development of mineral information and for technical management of the state mineral licensing and leasing system. GSI also provided technical assistance to the exploration and mining industry.

Ireland was considered to have a geologic potential for a variety of minerals. Interest in gold exploration was ongoing, thus providing the impetus for the revitalization of the exploration sector within the past few years. *(See table 2.)*

Aughinish Alumina Ltd.'s (AAL) production of alumina was based on imports of bauxite from the Republic of Guinea. A secondary source is Brazil.

The major market for AAL's alumina is primary aluminum smelters. British Alcan Aluminium PLC has been purchasing 65% of the refinery's output for its smelter in the United Kingdom. The remaining 35% was purchased by Billiton Aluminium Ireland Ltd. for its smelter in Norway.

Most gold exploration activity appeared to be focused on four areas that are known to contain significant mineralization. All the areas are in the Caledonies. Two areas are in the eastern part; one area in the western part; and the other area in the southern part.

A major upswing in activity in the lead and zinc sector was expected in Ireland. The country's output of zinc could double by the second half of the 1990's if the development of two new mines continues as planned. Several other potential projects also were under investigation at yearend.

The Tara Mine, at Navan, was one of the largest lead-zinc producers in Europe. Arcon International Resources PLC was proceeding with plans to develop its Galmoy deposit in County Kilkenny after receiving planning permission from the Kilkenny County Council.

A joint-venture lead-zinc project involving Ivernia West PLC and Minorco Lisheen Ltd. was continuing. Minorco Lisheen holds a 50% interest in the project and are the managers of the project. Applications for Planning Permission, Pollution Control License, and a State Mining Lease have been made for the Lisheen Mine development. Lisheen is on the same Rathdowney geologic trend as Arcon's Galmoy project, 8 kilometers (km) away in County Kilkinney.

Ireland produced significant quantities of synthetic diamonds. Output was not quantitatively reported, and information was not available to make reliable estimates of production. The two companies that manufacture industrial diamonds and super abrasives are De Beers Industrial Diamonds Div. (Ireland), a subsidiary of De Beers Consolidated Mines (Pty.) Ltd. of South Africa, and GE Superabrasives Ireland, a subsidiary of General Electric Co. of the United States.

A range of abrasives was produced from synthetic diamond, cubic boron nitride, and polycrystalline diamond (PCD). Trade names for the PCD products are Syndie for wire drawing blanks, Syndrill for rock cutting blanks, and Syndite for cutting tools and wear-resistant parts. All production was for the export market.

A hydrocarbon licensing round requesting bids covering acreage in the Erri and Slyne Troughs off the northwest Irish coast was completed. New incentives included abolition of royalties, the tax on profits reduced to 25%, and a 25-year retroactive exploration incentive, allowing all exploration costs incurred in Ireland during the last 25 years to be offset against future production.

Ireland has a good network of roads supplemented by a Government-owned railroad. Two deepwater ports at Cork and Dublin are supplemented by 10 secondary ports. Most mine sites are easily accessible and no more than 600 km from either deepwater port.

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The mineral industry is expected to utilize the opportunities created by the boom in gold and lead-zinc exploration and renewed interest from multinational companies to continue mineral developments.

GSI has an active data collection program through mapping and resource-related studies and offers technical assistance. This should continue to be a significant benefit and encouragement to companies engaged in mineral-resource activities.

TABLE 1
IRELAND: PRODUCTION OF MINERAL COMMODITIES 1/

(Thousand metric tons unless otherwise specified)

Commodity		1991	1992	1993	1994	1995 e/
METALS						
Alumina		981	973	1,100	1,000	1,000
Iron and steel, steel, crude		307	257	326	266	310
Lead:						
Mine output, Pb content		40,200	42,900	48,400	53,700	46,100 2/
Metal, refined, secondary		11,600	12,000	12,000	10,000	10,400 2/
Silver, mine output, Ag content	kilograms	10,500	13,100	13,000	17,400	15,000
Zinc, mine output, Zn content		188,000	195,000	194,000	195,000	184,100 2/
INDUSTRIAL MINERALS 3/						
Barite		94	70	53	--	--
Cement, hydraulic e/		1,600	1,600	1,600	1,550	1,500
Gypsum		342 e/	343 e/	318	325	350
Lime e/		110,000	110,000	100,000	100,000	110,000
Nitrogen, N content of ammonia		429	384 e/	367	380	375
Sand and gravel e/ 4/		7,000	7,000	7,500	7,800	7,500
Stone and other quarry products: e/						
Limestone		8,500	9,000	8,500	9,000	9,000
Other 5/		2,000	2,000	2,000	2,000	2,000
MINERAL FUELS AND RELATED MATERIALS						
Coal, anthracite and bituminous		6	2	1	1	1
Gas, natural: Marketed	million cubic meters	56	56 e/	58	55	60
Peat:						
For horticultural use		249	300 e/	300 e/	250	300
For fuel use: e/						
Sod peat 6/		1,000	1,200	1,000	1,200	1,200
Milled peat 7/		3,770	5,000	5,500	5,000	5,000
Total		4,770	6,200	6,500	6,200	6,200
Peat briquets e/		400	400	400	400	400
Petroleum refinery products: 8/						
Liquefied petroleum gas	thousand 42-gallon barrels	350	417	325	360	350
Naphtha	do.	400	349	350	350	350
Gasoline, motor	do.	3,000	3,070	3,120	3,000	3,000
Distillate fuel oil	do.	4,500	5,000 e/	5,000	5,000	5,000
Residual fuel oil	do.	4,000	4,580 e/	4,540	5,470	5,500
Refinery fuel and losses	do.	400	375 e/	400	400	400
Total e/	do.	12,650	13,791 e/	13,735	14,580	14,600

e/ Estimated.
1/ Table includes data available through Apr. 1996.
2/ Reported figure.
3/ Ireland also produces significant quantities of synthetic diamond and is the major supplier to the United States. However, output is not quanitatively reported and general information is inadequate to make reliable estimates of output levels.
4/ Excludes output by local authorities and road contractors.
5/ Includes clays for cement production, fire clay, granite, marble, rock sand, silica rock, and slate.
6/ Includes production by farmers and by Bord Na Mona.
7/ Includes milled peat used for briquet production.
8/ From imported crude oil.

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TABLE 2
IRELAND: STRUCTURE OF THE MINERAL INDUSTRY FOR 1995

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facility	Annual capacity
Alumina		Aughinish Alumina Ltd.	Aughinish Island, County Limerick	800
Barite		Magobar Ireland Ltd.	Silvermines, County Tipperary	240
Cement		Irish Cement Ltd.	Plants in Limerick and Platin	2,000
Lead-zinc		Outokumpu Oy	Tara Mine, Navan, County Meath	215
Natural gas	million cubic feet	Marathon Oil Co.	Kinsale Head Field, Celtic Sea	75,000
Peat		Bord Na Mona (Government Peat Board)	Production mainly in midlands	4,200
Petroleum, refined	barrels per day	Irish Refining Co.	Whitegate, near Cork	56,000
Steel		Irish Steel Ltd.	Haulbowline, near Cork	350

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THE MINERAL INDUSTRY OF

ITALY

By Harold R. Newman

Italy has been a significant processor of imported raw materials as well as a significant consumer and exporter of mineral and metal semimanufactured and finished products. The country was Western Europe's second largest cement producer after Germany, and its manufacturing of steel products was of world significance. Although Italy was an important producer of dimension stone, feldspar, and marble, and produced almost one-half of the world's pumice, the minerals sector experienced a further decline.

Most traditional mining either has stopped because of reserve depletion or has been suspended for environmental reasons. Production of potash and some rock salt has been suspended temporarily for environmental reasons.

The aggregated growth in the extractive industries was minimal. Among the metallic ores, lead and manganese were mined, although production was declining. Because of depleting reserves or uneconomical deposits, metallic mining was expected to cease by 1996.

Industrial mineral production remained the most important sector with overall output remaining more or less constant. However, domestic production of natural gas and petroleum continued to increase. Italy's most notable contribution to global mineral commodity supplies continued to be its production of processed materials based on imported raw materials. *(See table 1.)*

Italy increasingly has become dependent on its trade with other European Union (EU) countries.

It has been estimated that Italy's share of total exports going to EU partners has increased from 48% in 1981 to more than 60% in 1994. *(See table 2.)*

Private and public companies own facilities for the mining and processing of minerals and mineral products. Some state-owned enterprises often are retained for economic reasons and to maintain employment. The Government bank allocates credit to state-owned corporations to avoid the social impact of closure of uneconomic ventures. *(See table 3.)*

Alumina in Italy was produced only by Eurallumina S.p.A., at Portoscuso in Sardinia. The company was owned jointly by Alumix S.p.A. (52.1%) and by Australian interests. Almost all alumina in Italy was produced from imported bauxite, most of which was obtained from Australia and Guinea. Bauxite no longer was mined in any significant amount in Italy.

Alumix S.p.A., part of the state holding company Eute Fiere Italiane Atacchine, was the only primary aluminum producer in Italy. Alumix operated five smelters: one at Bolzano, one at Porto Marghera, and two at Fusina, all of which are near Venice; and one at Portoscuso in Sardinia.

More than 80% of aluminum production was used domestically. Italy imported almost 50% of its total aluminum requirements. Details on output and/or capacity were not readily available on Italy's several secondary aluminum producers.

Italian refined copper production has remained fairly consistent. Enirisorse S.p.A., formerly Nuova Samim S.p.A., was the largest producer of refined copper, lead, and zinc metal in Italy. Enirisorse produced about 55% of Italian copper metal. Virtually all of the country's output was derived from scrap, ashes, slag, and other residues.

Enirisorse also produced antimony metal, bismuth, gold, and silver. All sources of Enirisorse's scrap, from copper and aluminum cables to batteries, were handled by two subsidiaries, Nonfermet S.p.A. and Eurobatex S.p.A.

Secondary copper was produced by Enirisorse at Paderno Dugnano, near Milan, using alloy scrap and low-grade copper scrap as raw materials. Plant capacity for secondary copper was 50,000 t/yr. Copper scrap from European sources was refined by Enirisorse at its Porto Marghera copper-zinc plant, near Venice. Copper cathode capacity at the plant reportedly was increased to 60,000 t/yr in 1995.

In 1995 Italy imported most of its supplies of lead and zinc concentrates, with Canada being the largest single source for these commodities. Within Italy, most lead and zinc concentrate production came from Enirisorse's mines in Sardinia. This production has virtually stopped because reserves have been depleted. There is a small quantity of byproduct lead concentrate produced from fluorite operations. Enirisorse's lead and zinc smelters were also in Sardinia, and the zinc electrolytic plant was near Venice. The Porto Vesme smelter in Sardinia produced primary lead and zinc metal and cadmium, while the San Gavino complex, near Porto Vesme, produced refined lead and byproducts, such as bismuth, gold, and silver.

Secondary lead, including soft lead and alloys, was produced by Enirisorse at the Paderno Dugnano and Marcianise plants, whose capacities were 50,000 t/yr and 35,000 t/yr, respectively.

Enirisorse operated four zinc plants with a total capacity of 349,000 t/yr. The company also produced cadmium and germanium.

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Italy was the second largest producer of crude steel in the EU, after Germany. About 40% of steel in Italy was produced by basic oxygen furnaces and 60% was produced by electric arc furnaces. In Italy, about one-half of the steel was produced by private companies, with the rest by Government-owned enterprises. All iron ore was imported in 1995, of which about 40% came from Australia and 35% from Brazil. The country's steel industry imports about 3.5 Mt/yr of scrap, mostly from France and Germany.

Ilva was in the process of privatization and divesting itself of assets. The EC approved the sale of Ilva Laminati Piani (Ilp), the flat products unit at Taranto, to Riva SpA. The Ilp mill has a raw steel capacity of 10 Mt/yr. Under the reported deal, Riva paid $1.47 billion for the operation and assumed about $800 million of Ilp's debt. This deal moved Riva into second position in European steel capacity behind Usinor Sacilor of France.

There were three major operating companies in Italy producing barite: Mineraria Baritina S.p.A., with mines at Trentino, Monte Elto, and Primaluna, east of Milan; Samatec S.p.A. with one mine at Mastricarro in Calabri and one mine at Schilipario in the Alps; the Sardinian regional government's holding company Ente Mineraria Sarda, with mines at Barega, Iglesias Province, Mont 'Ega, Narcao Province, and Monte Tamara Province in Sardinia.

Most of the mines produced a 91% to 92% $BaSO_4$ granulated barite that was used by the well-drilling industry. The Mont 'Ega Mine produced a relatively high-grade 97% barite material that was used by the chemical industry.

Italy was a major EU producer of cement, ranking seventh in the world. Italcementi S.p.A. was the largest of Italy's 50 cement producers, with about 40% of the Italian market.

Most of Italy's bentonite mining took place on the island of Sardinia, with processing plants on the mainland. More than one-half of the country's bentonite production comes from Industria Chimica Carlo Laviosa S.p.A. The company's main mining activity was in the Pedra de Fogu and Puntenuova areas of Sardinia. Production from these areas fed the processing plants at Oristano in Sardinia and at Livorno, south of Pisa. Montmorillonite clay (white bentonite) was quarried at S`Aliderru in northwestern Sardinia. Caffaro S.p.A., operating in Sardinia, was Italy's only producer of acid-activated montmorillonite. The clay was shipped to the company's plant at Porto Marghera near Venice. Several small bentonite producers operated on the mainland, at Foggia in the district of Puglia and at Pietracuta di S. Leo in the Pesaro District.

Italy was the world's leading producer of feldspar and feldspathic minerals. These materials were important constituents of ceramic tile. Italy accounted for 30% of world tile output and more than 50% of the total tile produced in the EU. There were more than 350 small companies producing tiles, employing about 30,000 workers. Clay was imported from France, Germany, and the United Kingdom.

The largest producer of albite was Maffei S.p.A., which operated a surface mine at Pinzolo in the Trentin District. Miniera di Fragne S.p.A. also produced albite from its Mud di Mezzo surface mine and processed the material at its processing plant at Aladna Valsesia in Vercelli.

Marble and travertine production from the world famous quarries at Massa and Carrara has increased slightly in the past 2 years. Italian marble occurred in many localities, from the Alps to Sicily, and was quarried at hundreds of operations. The most important geographic area for producing white marble was in the Apuan Alps in Tuscany, particularly near the town of Carrara. The Lazio region, Lombardy, the Po Valley, Puglia, the Island of Sicily, and Venice were important colored marble-producing areas.

About one-half of production was in block form, and 45% of total production was exported. Annual output of the Carrara District is about 700,000 t, or almost 35% of the country's total white marble production.

Other major marble-producing areas included the Valle di Susa, near Turin in the northwestern Italian Alps; the valley of the Po River in Lombardy; the Verona-Vicenza area of Venice; and the vicinity of Benevento, northeast of Naples in southern Italy. Reserves are considered to be unlimited.

The production of potash continued to be suspended. The main reasons were the result of a severe drought that has restricted the availability of process water to the plants and the inability to remove waste material and mine water owing to environmental and ecological concerns. The three underground mines that were previously operating in Sicily, at Pasquasia, Racalmuto, and Realmonte, continued on standby.

Italy was the world's leading producer of pumice and pozzolan. The Mediterranean Island of Lipari, 40 km off the northern coast of Sicily, was the center of the Italian pumice industry.

Two companies quarried pumice for world markets, Pumex S.p.A and Italpomice S.p.A. Pumex, with about a 650,000 t/yr capacity, was Italy's largest pumice producer. The company quarried the Mount Pelato deposit on Lipari. Most pumice was exported to the United Kingdom. W. R. Luscombe Ltd., formerly an equity partner, became a wholly owned subsidiary of Pumex. Italpomice produced pumice at Acqualcalda on Lipari, with an output of about 70,000 t/yr.

Solmine S.p.A.'s Campiano pyrite mine in Tuscany became uneconomical to work because of mineral reserve depletion and associated problems. Pyrite production was stopped and the mine was closed in 1995.

Talco e Grafite Val Chisone S.p.A. operated two underground mines at Pinerolo near Turin. The white talc,

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mined from metamorphic rocks, has been of very high quality. Talco owned a 10% interest in an open pit mine at Orani, in Sardinia, with the other 90% belonging to the Sardinian Mining Board. Talco Sarda S.p.A. also operated a mine at Orani. Talco e Grafite Val Chisone S.p.A. operated an underground mine at Fontane, and Industria Mineraria Italiana S.p.A. (IMI) operated mines at Largone and Predaccia in Val Malenco, northern Italy. About 35% of IMI's production reportedly was exported to France, Germany, and the Netherlands.

Italy was heavily dependent on imported coal, mostly from the United States and South Africa.

Geothermal energy was produced in the Larderello, Monte Amiata, and Travale areas in Tuscany. Geologic, geostructural, and seismic exploration has been actively pursued in these areas along with research for power stations exploiting geothermal energy.

There were more than 100 natural gas fields in operation, of which 70% was located offshore. Natural gas supplied almost 25% of Italy's total energy needs. About 35% was produced domestically. More than 25% was imported from Algeria through a 1,070-km-long natural gas pipeline from Algeria to Mazzara del Vallo in Sicily. The former Soviet Union (FSU) continued to supply 25% of the country's natural gas through a pipeline across Austria and the Czech Republic.

With an annual consumption of almost 95 Mt of petroleum, Italy was the EU's second largest petroleum consumer after Germany. Italy was almost totally dependent on imported petroleum. With no large coal or gas industries, petroleum accounted for 75% of the country's energy needs.

A total of 20,085 km of railroad track was operational in 1995. Highways totaled 294,410 km. Superhighways totaled 5,900 km, and 7,010 km of Italy's roads were unpaved, mostly in the southern half of the country. There were 1,203 km of crude oil pipelines in service, 2,143 km of refined product pipelines, and 13,740 km of gas pipelines.

Public and private spending on environmental controls is expected to grow, particularly in the areas of water-treatment, transportation equipment and services, urban and industrial waste disposal, remediation of soil contamination, and control of emissions.

Mining of metallic ores, for all practical purposes, was expected to cease. The metals-processing industry, based primarily on imported stocks, is expected to continue to play an important role in Italy's economy. Italy is expected to remain a large producer of secondary aluminum and crude steel in the EU.

The industrial minerals quarrying industry and preparation plants are expected to remain significant, especially in the production of barite, cement, clays, fluorspar, marble, and talc. Italy was expected to continue to be the world's leading producer of feldspar, feldspathic minerals, and pumice. The ceramics sector is expected to be important, particularly regarding exports.

Domestic output of natural gas, crude petroleum, and petroleum refinery products is expected to grow, while Italy will continue to depend on imported coal, gas, and petroleum.

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TABLE 1
ITALY: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity		1991	1992	1993	1994	1995 e/
METALS						
Aluminum:						
Bauxite, gross weight		8,600	97,500 r/	90,100	23,400	--
Alumina, calcined basis		805,000	762,000 r/	840,000	825,000	825,000
Metal:						
Primary		205,636	202,871	129,732	175,631	177,900 2/
Secondary		343,000	353,100	346,100	318,900	325,500 2/
Antimony, oxides, gross weight 3/		861	1,170	942	900	900
Bismuth metal		45	20 r/	15	5	5
Cadmium metal, smelter		658	742	517	475	308 2/
Copper, metal, refined, all kinds		82,500	76,000	90,300	84,000	93,000
Iron and steel, metal:						
Pig iron	thousand tons	10,856	10,462	11,066	11,157	11,684 2/
Ferroalloys:						
Blast furnace, silicon pig iron e/		600	500	500	500	500
Electric furnace:						
Ferrochromium		47,192	60,315	53,504	22,650	25,000
Ferromanganese		14,145	17,079	17,000	16,000	16,000
Ferrosilicon		12,648	12,000	3,350	--	--
Silicomanganese e/		55,000	50,000	50,000	50,000	50,000
Silicon metal		6,200	10,000	--	--	--
Other e/		14,500	12,000	12,000	10,000	10,000
Grand total e/		150,285	161,894	136,354	99,150	101,500
Steel, crude	thousands tons	25,046	24,904	25,701	26,114	27,770
Semimanufactures	do.	23,817	23,331	21,760	22,775	22,000
Lead:						
Mine output, Pb content		14,199	21,596	8,011	7,400	6,000
Metal, refined:						
Primary		111,696	102,000	89,900	91,700	90,000
Secondary		96,500	84,300	92,900	114,200	115,000
Total		208,196	186,300	182,800	205,900	205,000
Magnesium:						
Mine output, Mg content		3,910	--	--	--	--
Metal, primary		3,920 r/	1,210 r/	--	--	--
Manganese, mine output:						
Gross weight		8,340	8,346 r/	8,300	8,000	8,000
Mn content		2,102	2,087 r/	2,075	1,868	2,000
Silver metal	kilograms	176,475	128,716 r/	92,635	80,000	80,000
Zinc:						
Mine output, Zn content		37,124	35,032 r/	7,100	22,900	20,000
Metal, primary		264,000	253,000	254,000	242,000	250,000
INDUSTRIAL MINERALS						
Asbestos		15,000	--	--	--	--
Barite		88,486	74,900 r/	52,697	57,856	50,000
Bromine e/		400	300	300	300	300
Cement, hydraulic	thousand tons	40,800 r/	41,300 r/	42,000	33,192	35,000
Clays, crude:						
Bentonite	do.	385	150 r/	327	386	402
Refractory excluding kaolinitic earth	do.	462	400 e/	434 r/	619 r/	730
Fuller's earth	do.	23	28 r/	20 r/	24 r/	37 2/
Kaolin	do.	53	33 r/	76 r/	74 r/	88 2/
Kaolinitic earth	do.	16	15	15	7 r/	10
Diatomite e/		23,000	26,000	25,000	25,000	25,000
Feldspar		1,304,203	1,387,968 r/	1,534,210	1,806,935	1,800,000
Fluorspar:						
Acid-grade		60,650	55,000	35,000	52,630 r/	25,000
Metallurgical-grade		37,868	25,000	25,000	15,312 r/	10,000
Total		98,518	80,000	60,000	67,942	35,000

See footnotes at end of table.

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TABLE 1–Continued
ITALY: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity		1991	1992	1993	1994	1995 e/
INDUSTRIAL MINERALS–Continued						
Gypsum	thousand tons	764	835	1,200	1,361	1,200
Lime, hydrated, hydraulic and quicklime e/	do.	3,800	3,600	3,600	3,500	3,500
Nitrogen, N content of ammonia	do.	1,150	1,100	729	504	500
Perlite e/		70,000	65,000	65,000	65,000	60,000
Pigments, mineral, iron oxides, natural e/		800	700	700	600	600
Potash, crude salts:						
Gross weight	thousand tons	429	940	200	--	--
K_2O equivalent	do.	63	126	24	--	--
Marketable product, K_2O equivalent	do.	31	86	20	--	--
Pumice and related materials: e/						
Pumice and pumiceous lapilli	do.	700	600	700	700	700
Pozzolan	do.	4,500	4,500	4,500	4,500	4,500
Pyrite, all types, gross weight	do.	553	441	402	400	400
Salt:						
Marine, crude e/ 4/	do.	450	610	580	600	600
Rock and brine	do.	3,504	3,210 r/	3,150	3,300	2,800
Sand and gravel: e/						
Volcanic sand	do.	100	100	100	100	100
Silica sand	thousand tons	4,200	4,000	4,000	4,000	4,000
Other sand and gravel		125,000	125,000	125,000	125,000	125,000
Sodium compounds: e/						
Soda ash	thousand tons	600	600	500	500	500
Sodium sulfate	do.	125	125	125	125	125
Stone: e/						
Dimension: 5/						
Calcareous:						
Alabaster	do.	20	20	20	25	25
Marble in blocks:						
White	do.	1,600	2,700	3,600	3,600	3,600
Colored	do.	1,900	2,000	2,900	3,000	3,000
Travertine	do.	1,100	1,000	1,000	1,000	1,000
Other:						
Granite	do.	2,500	1,500	1,000	1,000	1,000
Sandstone	do.	1,800	1,800	1,800	1,800	1,800
Slate	do.	120	120	120	120	120
Crushed and broken:						
Dolomite	do.	800	700 r/	700	700	700
Limestone	do.	120,000	125,000	120,000	120,000	120,000
Marl for cement	do.	13,123	14,100	14,000	12,000	14,000
Serpentine	do.	1,500	1,500	1,500	1,500	1,400
Quartz and quartzite	do.	250	250	250	250	250
Sulfur, recovered as elemental and in compounds:						
S content of pyrite	do.	214	174	145	150	130
Byproduct, oil refining and other sources e/		280	280	300	300	300
Total e/	do.	494	454	445	450	430
Talc and related materials		161,000	183,530 r/	142,000	139,000	130,000
MINERAL FUELS AND RELATED MATERIALS						
Asphalt and bituminous rock, natural		39,300	36,000	38,000	36,000	360,000
Carbon black e/		150,000	140,000	130,000	130,000	125,000
Coal:						
Lignite	thousand tons	1,550	1,140 r/	1,050	56	60
Subbituminous (Sulcis coal)		172,000	109,000 r/	7,600	--	--
Coke, metallurgical	thousand tons	5,771	5,350	5,000	5,000	5,000
Gas, natural	million cubic meters	17,398	18,150	19,427	20,506	20,500
Natural gas liquids e/	thousand 42-gallon barrels	400	400	400	400	400

See footnotes at end of table.

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TABLE 1—Continued
ITALY: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity		1991	1992	1993	1994	1995 e/
MINERAL FUELS AND RELATED MATERIALS—Continued						
Petroleum:						
Crude	thousand 42-gallon barrels	29,344	30,000	31,320	31,680	32,000
Refinery products:						
Liquefied petroleum gas	do.	24,580	29,963	25,543	26,622	26,000
Gasoline	do.	151,513	163,531	161,823	160,251	160,000
Naphtha	do.	15,782	16,000	16,000	16,000	16,000
Jet fuel e/	do.	18,000	22,214	22,206	23,007	24,000
Kerosene e/	do.	30,000	34,092	34,038	34,929	35,000
Distillate fuel oil	do.	221,569	220,000	218,000	220,000	220,000
Residual fuel oil	do.	148,278	157,043	154,112	138,781	140,000
Other	do.	32,165	35,000	35,000	35,000	35,000
Refinery fuel and losses e/	do.	40,000	38,000	39,000	38,000	38,000
Total e/	do.	681,887	715,843	705,722	692,590	694,000

e/ Estimated. r/ Revised.

1/ Table includes data available through Mar. 1996.

2/ Reported figure.

3/ Antimony content is 83% of gross weight.

4/ Does not include production from Sardinia and Sicily estimated at 200,000 tons annually.

5/ Output of limestone and serpentine for dimension stone is included with "Stone: Crushed and broken." In addition to the commodities listed, a variety of other dimension stone was produced and previously listed, but available general information was inadequate for continued reliable estimation of output levels.

TABLE 2
ITALY: 1994 BALANCE OF PAYMENTS, SELECTED MINERAL COMMODITIES 1/

(Thousand dollars)

Mineral commodity	Exports to EU	Imports from EU	Net gain or (loss)	Exports to the world	Imports from the world	Net gain or (loss)
Crude industrial minerals:						
Feldspar	1,462	2,296	(843)	3,419	19,464	(16,045)
Magnesite	425	1,017	(592)	1,242	5,384	(4,142)
Slate	124	752	(628)	1,641	1,171	470
Other	148,586	435,686	(287,100)	394,638	1,003,247	(608,609)
Total	150,597	439,751	(289,154)	400,940	1,029,266	(628,326)
Metalliferous ores:						
Copper	233	74	159	405	142	263
Lead	2	4,694	(4,692)	900	22,042	(21,142)
Tin	232	179	53	249	179	70
Zinc	47	34,185	(34,138)	47	132,748	(132,701)
Other (including waste and scrap)	68,111	1,169,733	(1,101,622)	166,712	2,256,349	(2,089,637)
Total	68,625	1,208,865	(1,140,240)	168,313	2,411,460	(2,243,147)
Nonmetallic mineral manufactures	757,016	254,578	502,438	1,912,622	413,019	1,499,603
Metals:						
Iron and steel	3,543,303	3,787,434	(244,131)	6,517,518	6,079,981	437,537
Mercury	72	35	37	73	57	16
Other nonferrous metals	1,267,132	2,292,211	(1,025,079)	1,928,262	4,304,242	(2,375,980)
Total	4,810,507	6,079,680	(1,269,173)	8,445,853	10,384,280	(1,938,427)
Mineral fuels	580,022	1,564,583	(984,561)	3,001,618	13,636,473	(10,634,855)

1/ Table prepared by Harold Willis, International Data Unit.

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TABLE 3
ITALY: STRUCTURE OF THE MINERAL INDUSTRY OF 1995
(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity
Alumina	Eurallumina S.p.A. (Alumix S.p.A 52.1%, and Comalc 26.9%, Clarendon 21%,- both Australian companies)	Plants at Portoscuso, Sardinia, and Porto Marghera, near Venice	720
Aluminum	Alumix S.p.A.	Smelters at Portoscuso, Sardinia; Porto Marghera and Fusina near Venice	255
Asbestos	Amiantifera di Balangero S.p.A.	Mine at Balangero, near Turin	100
Barite	Bariosarda S.p.A (Ente Mineraria Sarda)	Mines at Barega, and Mont 'Ega, in Sardinia	100
Do.	Edem S.p.A. (Government)	Mines at Val di Castello, in Lucca	20
Do.	Edemsarda S.p.A. (Soc. Imprese Industriali)	Mines at Su Benatzu, Sto Stefano, and Peppixeddu, in Sardinia	20
Do.	Mineraria Baritina S.p.A	Mines at Marigolek, Monte Elto, and Primaluna, near Mila	20
Bauxite	Sardabauxiti S.p.A. (Government)	Mine at Olmedo, Sardinia	350
Cement	52 companies, of which the largest are:		
Do.	Italcement-Fabbriche Riunite Cemento S.p.A.	19 plants, of which the largest are Calusco, Monselice, and Collefero	(6,003)
Do.	Cementerie del Tirreno S.p.A (Cementir)	Plants at Arquasta Scivia, Livorno, Maddaloni, Napoi, Spoleto, and Taranto	(6,250)
Do.	Unicem S.p.A.	Plants at Guidonia, Lugagnano, Morano, Piacenza, S'Arcangelo di Romagna, and Settimello	(4,630)
Copper, refined	Enirisorse (Government)	Refineries at Porto Marghera, and Pieve Vergonte	46
Do.	Europa Metalli - LMI S.p.A.	Refineries at Campo Tizzoro,, Fornaci di Barga, and Villa Carcina	26
Do.	Chimet S.p.A.	Refinery at Arezzo	13
Feldspar	At least 5 companies, of which the largest are:		1,500
Do.	Maffei S.p.A.	Surface mines at Pinzolo, Sondalo, and Campiglia Marittima; underground mine at Vipiteno	(200) (300)
Do.	Miniera di Fragne S.p.A.	Surface mine at Alagna Valsesia	(60)
Do.	Sabbie Silicee Fossanova S.P.A. (Sasifo)	Surface mine at Fossanova	(30)
Lead-Zinc, ore	Enirisorse (Government)	Mines at Masua, Monteponi and Sardinia	60
Lead, metal	do.	Refinery at San Gavino, Sardinia	80
	do.	Kivcet smelter and Imperial Smelter at Porto Vesme, in Sardinia	114
Lignite	Ente Nazional per L'Energia Elecltrica (ENEL)	Surface mines at Pietrafitta ,in Umbria, and Santa Barbara,	1,500
Magnesium, metal	Societa Italiana Magnesio S.p.A. (INDEL)	Plant at Bolzano	8
Marble	A number of companies including:	Quarries mostly at Carrara and Massa	2,000
	Mineraria Marittima Srl	Quarries in the Carrara and Massa areas	(500)
	Industria dei Marmi Vicentini S.p.A.	Quarries in the Carrara area	(300)
	Figaia S.p.A.	Quarries in the Carrara area	(100)
Petroleum, crude	Ente Nazional/Idrocarburi (ENI) Government	Oilfields: Offshore Sicily and in the Adriatic Sea; onshore in Po River Valley	90
Petroleum, refined	do.	About 30 refineries	2,000 1/
Potash ore	Industria Sali Otassici e Affini per Aziono S.p.A.	Underground mines at Corvillo, Pasquasia, Racalmuto, and San Cataldo, in Sicily	1,300
Do.	Sta Italiana Sali Alcalini S.p.A. - (Italkali)	Underground mines at Casteltermini and Pasquasia, in Sicily	700
Pumice	Pumex S.p.A.	Quarries on the Lipari Island, north of Sicily	600
Do.	Sta Siciliana per l'Industria ed il Commercio della Pomice di Lipari S.p.A. (Italpomice)	do.	200
Pyrite	Nuova Solmine S.p.A.	Underground mines at Campiano and Niccioleta	900
Salt, rock	Sta Italiana Sali Alcalini S.p.A. (Italkahi)	Underground mines at: Petralia, Racalmuto, and Realmonte, in Scility	4000
Do.	Solvay S.p.A.	Underground mines at Buriano, Pontteginori, and Querceto in Tuscany	2,000
Steel	Ilva S.p.A. (Government)	34 steel plants, the largest of which: Taranto	13,000 (8,000)
Do.	Riva S.p.A	About 5 plants	5,000
Do.	Others	Various locations	10,000
Talc	Talco e Grafite Val Chisone S.p.A.	Mines at Pinerolo, near Turin, and at Orani, Sardinia	120
Do.	Industria Mineraria Italiana S.p.A.	Mine at Largone Predaccia	20
Do.	Talco Sarda S.p.A.	Mine at Orani, Sardinia	20
Zinc, metal	Enirisorse (Government)	Plants at Crotone and Porto Vesme, in Sardinia, and Porto	349

1/ Thousand 42-gallon barrels per day.

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THE MINERAL INDUSTRY OF

KAZAKSTAN

By Richard M. Levine

Kazakstan was the second largest country in land area after Russia to form from the republics of the former Soviet Union (FSU). It is endowed with large reserves of a wide range of minerals. Kazakstan produced a major portion of the FSU's output of a number of metals, including beryllium, bismuth, cadmium, chromite, copper, ferroalloys, lead, magnesium, rhenium, titanium, uranium, and zinc. It had significant production of a number of other mineral products, including arsenic, barite, coal, gold, molybdenum, natural gas, oil, phosphate rock, and tungsten.

In 1995, the gross domestic product (GDP) decreased by 8.9% and industrial production by 8% compared with that of 1994. However, in 1995, according to statistics of the Commonwealth of Independent States (CIS), production of ferrous metals increased by 9%, nonferrous metals by 2%, and chemical and petrochemical products by 8% compared with that of 1994.

Government Policies and Programs

Growth in the mineral sector, which was contrary to general trends within the economy, coincided with Kazakstan adopting a new form of management for its mineral-production sector in 1995. At the end of 1994 and throughout 1995, Kazakstan engaged in a new program for the management of mineral industry enterprises that combined Government ownership, privatization, and foreign management. This program involved Kazakstan transferring the majority of its major mining and metallurgical industries, excluding gold, to the management of foreign companies for a limited number of years. Plans for 1996 called for extending foreign management to some gold-mining enterprises.

The foreign managers were to invest in upgrading equipment, dealing with social and ecological problems, paying off debts, striving to increase production and profitability, and attracting investment. Most foreign managed plants were reporting meeting these goals, so it appears that this new system of temporary foreign management was successful in reversing the downward trends in Kazakstan's mineral industries. Foreign management companies were being offered a share of current profits and (some were also being offered) the right to purchase stock in these enterprises.

Most mineral development licenses issued to foreign investors were for mineral extraction or a combination of geologic exploration and extraction with the greatest interest among investors in hydrocarbon and gold deposits. Of 1,014 license applications received by the Ministry of Geology and Underground Resources at yearend 1995, 45.2% were for precious metals, 7.1% for copper, and 4.4% for lead-zinc polymetallic deposits.

Environmental Issues

Mineral production and utilization was a major creator of industrial wastes that consisted in large part of flotation residues, ash slag wastes, blast furnace slag, asbestos cement wastes, and alumina production slurry. According to Kazakstan's Ministry of Ecology and Bioresources, metallurgical enterprises are a main source of pollution, accounting for about 15% of the waste generated in Kazakstan. Of this total, nonferrous metallurgical enterprises were producing about 60% by volume of the toxic wastes.

Air pollutants from metallurgical enterprises consisted mainly of sulfur dioxide and also consisted of toxic compounds of arsenic, copper, and lead. Permissible norms for sulfur dioxide concentration in the air were exceeded in the metallurgical centers of Oskemen and Leninogorsk by three times and in Balkhash by two times. High levels of lead pollution were observed in the cities of Shymkent, Dzhezkazgan, and Leninogorsk where the average lead concentration was one to two times above the permissible norm. The highest monthly average levels of lead pollution in the air in the city of Shymkent exceeded the permissible norms by 10 times, in Dzhezkazgan by nine times, and in Oskemen and Leningorsk by three times. At the lead plant in Shymkent, two extremely high cases of pollution were reported where lead in the air exceeded the permissible norm by 56 times and 62 times.

Nonferrous metallurgical enterprises were substantial contributors to water pollution, particularly for copper and zinc contamination. In 16 cases, the Glubochanka River registered lead levels that were 540 times above the permissible norm and in 1 case where the copper contamination was 140 times higher than the permissible norm. Reportedly, the Krasnoyarka River registered 5 cases where zinc contamination was 342 times higher than the permissible norm, the Breska River 6 cases of copper pollution 340 times above the permissible norm, the Bukhtarma River 1 case of copper contamination 194 times

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above the permissible norm, and the Ulba River 1 case of copper contamination 131 times above the permissible norm.

In addition to nonferrous metallurgy, chemical enterprises identified by the Ministry as significant polluters included the Khambyl Superphosphate plant and the Shymkent and Nodfas Phosphorus plants with atmospheric discharges of phosphorous anhydride, phosphoric hydrogen and hydrogen fluoride and the Aktyaubinsk Chrome Compounds plant with atmospheric discharges of 4,380 kilograms of sixth valency chrome compounds in 1994, and the Temirtau carbide plan with atmospheric discharges of 166 kilograms of mercury in 1994.

As a result of the utilization of coal in powerplants from the Ekibastuz basin which has an extremely high ash content and does not undergo preliminary washing, large regions of the country are contaminated with atmospheric discharges of ash and other pollutants. In the region of oil and gas production, the main source of air pollution were carbon oxides and sulfur dioxide from natural gas production. Surface pollution was connected with oil spills and pipelines leakages.

Commodity Review

Metals

Aluminum.—In 1995, bauxite production reportedly increased by about 35% compared with 1994 to 3.3 million metric tons (Mt). Plans called for further development of bauxite mining in Kazakstan to supply the Pavlodar alumina plant. Pavlodar has the capacity to produce 1.2 million metric tons per year(Mt/yr) of alumina. A consortium of Kazakstan, Russian, and western firms including the United Kingdom's White Swan Ltd. and Iceland's Ivedon International Ltd. plan to develop the Eastern Ayat bauxite field with reserves reportedly of 90 Mt of bauxite.

The Pavlodar plant is currently being supplied by local sources, but is still forced to import about 300,000 metric tons per year (t/yr) from Australia and Guinea. In December 1994, White Swan gained the right to manage Pavlodar for a 5-year period.

Beryllium.—The Ulbinskiy plant in Oskemen was the only producer of beryllium metal in the FSU. The Ulbinskiy plant has been converted into a joint-stock company. Major shareholders include the Kazakstan firm KATER, an umbrella organization for the country's nuclear industries, and the Russian financial group TVEL. Plans for the Ulbinskiy plant called for maintaining production of the same types of mineral products, but converting a large portion of the output to civilian rather than military uses.

In March 1996, the U.S. International Trade Commission gave notice of the institution of a preliminary antidumping investigation of imports of beryllium metal and high-beryllium alloys exported to the United States from Kazakstan and alleged to be sold at less than fair market value.

Chromite.—The Donskoy complex in Kazakstan had produced more than 95% of the chromite output of the FSU. In 1995, chromite production reportedly increased by almost 20% to 2.9 Mt compared with 1994 output of 2.4 Mt. Following the breakup of the Soviet Union, output of chromite at Donskoy had fallen sharply from its peak levels of over 3.5 Mt/yr. Production occurred at three open pit mines and one underground mine. Underground mining accounted for almost one-half of the output, and it was envisaged that underground mining would account for three-fourths of output by the year 2000. Reserves at Donskoy's two open pits reportedly were on the verge of depletion and development of a third open pit had been delayed. In the ferrochromium sector, in 1995 the Aksu (formerly Yermak) ferroalloys plant reported producing at only 30% capacity and the Ferrokhrom (formerly Aktyubinsk) ferroalloys plant reported that three furnaces were idle during the year.

In 1995, Kazakstan started a new system of management in the chromite industry as the country turned the management of its chromite mining and ferrochromium industries over to the Japan Chrome Corporation (JCC). The arrangement reportedly met with success as in the second half of 1995 ferrochrome production increased by 32.6% at the Aksu (Yermak) and by 31.6% at the Ferrokhrom (Aktyubinsk) ferroalloys plants compared with the same period in 1994. Kazakstan was planning to increase production of ferrochrome output in 1996 to 720,000 tons (t), in part by converting production of some ferrosilicon capacity at the Aksu plant to ferrochromium production. Much of the increased output would be intended for world markets.

Under the management of JCC, the ferrochromium industry was reorienting its production towards world markets and away from sales for consumption primarily within the FSU. Along these lines, the Ferrokhrom plant stopped production of low-carbon ferrochromium primarily for the Russian market in favor of high-carbon ferrochromium production for world markets. This new management arrangement apparently caused disruptions in chromite supply to Russia, as one of JCC's first actions was to halt chromite shipments contracted to Russia. Kazakstan reportedly shipped 360,000 t of chromite to Russia during the first half of 1995, but during the second half of the year shipped almost none. This resulted in ferrochromium output falling at Russia's major ferroalloys plants.

Copper.—Mine output of copper in 1995 reportedly decreased to 260,000 t compared with 285,000 t in 1994. A major problem confronting Kazakstan's copper mining enterprises is depletion of ore reserves. At the Balkhash mining and metallurgical complex that produces about 135,000 t of cathode copper per year, copper was mined at three deposits in central Kazakstan and at a mine in western Kazakstan. Only one-third of the Balkhash refinery's demand for raw material, however, was being met by production from the Balkhash complex. Plans were being formulated in conjunction with Switzerland's Cam Finance S.A. to develop

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two new copper deposits in Pavlodar oblast enabling Balkhash to provide 100% of its own ore requirements.

In June 1995, management of the Dzhezkazgantsvetmet copper mining and metallurgical complex was turned over to Samsung Deutschland, a subsidiary of the Republic of Korea's Samsung. The new management company was committed to paying off Dzhezkazgantsvetmet's debt of 10 billion tenge ($157 million) and boosting output of copper cathode from 80,000 t/yr to 200,000 t/yr which was near Dzhezkazganstsvetmet's capacity. In September 1995, the Cyprus registered Dalex Trading Ltd. was granted the right to manage the East Kazakstan Copper and Chemical Complex.

Gallium.—The Pavlodar alumina plant which produces gallium is now under the management of the United Kingdom's White Swan Ltd. Plans call for turning Pavlodar into a major producer and exporter of gallium.

Gold.—Primary gold production in 1995 was reported to be 15 t, which was an increase over 1994 primary gold output of 14.48 t. Nonferrous mining and metallurgical operations produced an estimated 10 tons of byproduct gold. The country foresees a large increase in gold production occurring from joint ventures and new investment with native gold production targeted to reach 50 t/yr in the year 2000. A number of gold deposits are being explored and considered for development. To accomplish this increase in gold production, in July 1995 the country enacted a new "Gold Law" allowing foreign companies to export all of the precious metals they produce.

Kazakstan has issued licenses for the exploration of over 100 gold deposits including joint ventures with foreign companies. These include joint ventures to develop the Yubeleynoye gold deposit near Aktobe and the Vasilkovskoye deposit in northern Kazakstan, to explore for gold in the Akmola region, and to develop the Bakyrchik deposit in northeastern Kazakstan.

The United Kingdom's Kazakstan Minerals Corp. (KazMinCo) is involved in the exploration of the Shatyrgul and Zhaisan copper-gold-molybdenum deposits, the Samarskoye and Vavarinskoye gold-copper deposits, the Akbakai goldbelt, and the Duman-Shuak, Gagarinskoye, Samarskoye, and Shokai gold deposits. KazMinCo has operational control of seven joint ventures with Kazakstan partners for advanced gold and copper exploration projects.

The Santa Fe Pacific Gold Corp. of the United States signed a joint-venture agreement with Kazakstan for exploration and development of over 3 million hectares of land in northeastern Kazakstan. Santa Fe Pacific reportedly has agreed to spend $6 million for exploration over a 5-year period and will be responsible for financing any development.

Pegasus Gold Inc. from the United States became a 50-50 joint-venture partner with Canada's Goldbelt Resources Ltd. in a project to process tailings from the Leninogorsk polymetallic complex that Goldbelt already had been involved in for 3 years. Reportedly, about 100 million tons of tailings grading 0.022 ounces per ton of gold and 0.167 ounces per ton of silver have been accumulating at Leninogorsk.

Iron and Steel.—In 1995 production of crude steel and pig iron increased, but both were still only approximately one-half of their 1992 production levels.

Kazakstan's major steel mill is the Karaganda steel complex, Karmet, with the capacity to produce 5.1 Mt/yr of pig iron, 6.3 Mt/yr of crude steel, and 4.7 Mt/yr of rolled steel. Karmet was only working at below 50% capacity. In October 1995, the United Kingdom's Ispat International Ltd. won the right to manage Karmet. The previous management firm, the Israeli Eisenberg Group, a subsidiary of U.S. Steel, had its management rights removed by the Kazakstan government.

Ispat reportedly agreed to invest $950 million in the Karaganda steel mill. The agreement reportedly calls for Ispat to buy assets and clear liabilities valued at about $450 million and then to invest $500 million to upgrade the steel mill. Ispat stated that it planned to increase output of rolled steel by 30% in 1996 and by 50% in 1997 over 1995 levels. Plans also include reducing the work force at Karaganda from 38,000 to 28,000 employees and expanding the plants exports. Ispat reportedly was offered significant ownership shares in Karmet.

Iron Ore.—In 1995 iron ore and concentrate production in Kazakstan increased to 14.9 Mt compared with 10.4 Mt in 1994 and pellet production increased to 7.2 Mt compared with 4.8 Mt in 1994. The Icelandic firm Ivedon International Ltd. received a 5-year contract to manage the Skolovsko-Sarbay iron ore mining and beneficiation complex, Kazakstan's largest iron ore producer and only pellet producer. Ivedon promised to extend a $56 million credit to the complex and to pay off with a loan a $17 million debt owed by customers. The management contract calls for 75% of Sokolovsko-Sarbay's output to be sold outside Kazakstan.

In 1995, iron ore production at Sokolovsko-Sarbay increased to almost 10 Mt of iron ore and concentrate and 7.2 Mt of pellets compared with 1994 production at Sokolovsko-Sarbay of almost 6 Mt of iron ore and concentrate and 4.8 Mt of pellets.

Lead-Zinc.—Mine output of lead concentrates in Kazakstan had fallen by more than two-thirds since 1992. In 1995, mine output of lead fell by almost one-third to 40,000 t compared with 57,000 t in 1994. Production of refined lead fell by almost 60% since 1992 and fell by almost one-third in 1995 compared with 1994. Mine output of zinc had fallen by more than 25% since 1992, but in 1995 remained at the 1994 level of 190,000 t. Kazakstan's two zinc smelters in East Kazakstan, the Ust-Kakmenogorsk and Leninogorsk smelters, were not receiving adequate amounts of concentrates.

Several lead-zinc industry enterprises in 1995 were placed under new domestic management. A Kazakstan company, Metalou Ltd., was assigned the right to manage the Ust-Kamenogorsk lead-zinc enterprise and the Zyryanovsk lead

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plant. The Kazakstan Postovalov Co. obtained a 5-year contract to manage the Karagaily lead-zinc mining and beneficiation complex.

Titanium.—The Ust-Kamenogorsk titanium-magnesium plant, with an estimated capacity of 35,000 t/yr of titanium sponge, had produced 40% of the titanium sponge in the FSU. Titanium raw material came from Ukraine and carnallite and other raw materials from Russia; curtailments in raw materials shipments caused raw material shortages at Ust-Kamenogorsk.

Reportedly Ust-Kamenogorsk was the most modern of the plants in the FSU and was fully integrated to the ingot stage; it was the only plant in the CIS that used vacuum distillation of sponge.

In 1995, the Government signed over the management of the Ust-Kamenogorsk titanium-magnesium plant to the Belgium Specialty Metals Co. for a 5-year period. Plans call for enlarging the domestic raw material base for Ust-Kamenogorsk.

Industrial Minerals

Phosphate.—After decreasing sharply in the first half of the 1990's, production of phosphate rock began to increase in 1995. The major producer of phosphate rock was the Karatau complex where the phosphate rock has a P_2O_5 content ranging from 21% to 29%. The Chilisay complex in Kazakstan had also been under development, but the P_2O_5 content of the ore was less than at Karatau.

Mineral Fuels

Coal.—Coal production in 1995 fell by about 20% compared with 1994 to 83.2 Mt. The fall was attributed in part to coal mining enterprises lacking working capital as consumers were in arrears in paying for coal. These financial constraints prevented the industry from making needed renovations.

Plans call for increasing coal production in 1996 to 96.1 Mt, with a portion of this increase to come from the Shubarkol open pit, the management of which was assigned to the Global Mineral Reserves, Inc. from the United States. Kazakstan reportedly was also seeking foreign investment for developing new coal fields at explored deposits.

Petroleum.—In 1995, Kazakstan reportedly extracted 300,000 t more crude oil than was produced in 1994. In 1995, Kazakstan exported 6,989,400 t of oil and gas condensate, of which 3,725,300 t was exported outside the FSU and 3,264,100 t within the FSU. Refinery output reportedly was 9,280,000 t of petroleum products, of which 2,190,000 t was gasoline, 3.3 Mt diesel fuel, and 3,790,000 t fuel oil, with Kazakstan also exporting refinery products.

Despite Kazakstan's large oil and gas reserves, over the past 3 years oil and gas production had fallen by 25% to 30%. Furthermore there was a sharp decrease in domestic geologic exploration. Exploration of Kazakstan's Caspian Sea Shelf extending over an area of 100,000 square kilometers was underway by a consortium comprised of seven major western firms with reportedly predicted resources of 3.5 to 4.8 billion t of oil and 2 trillion cubic meters (m3) of natural gas. Kazakstan, based on the Soviet reserve classification system, reportedly has 2.21 billion t of explored oil reserves, 690 Mt of explored condensate reserves, and 2.249 trillion m^3 of explored natural gas reserves. (Refer to the U.S Geological Survey Minerals Yearbook Russia chapter for an explanation of the Soviet reserve classification system.)

There were 13 joint ventures that had been established in the Kazakstan oil industry, but their level of activity was quite diverse, with a number of the joint ventures not having engaged or having delayed development. Kazakstan had a total of 20 oil and gas joint ventures, 5 of which were formed in 1995. Only 11 of the joint ventures were in operation, producing in 1995 a total of 2.5 Mt of oil and 2 billion m^3 of natural gas. Kazakstan has two major oil fields, the Tengiz oil field with estimated reserves reportedly between 500 to 800 Mt of oil and the Mangyshlak oil and gas condensate field containing the Karachaganak deposit with estimated reserves reportedly of more than 200 Mt of oil, more than 650 Mt of gas condensate, and 1.3 trillion m^3 of natural gas.

Development of the Tengiz field which is being conducted by a joint venture with the United States Chevron Corp., was delayed because of the lack of a transport network to export the oil to major Western and Southeast Asian markets and because of inadequate refining facilities. Although an agreement was reached between Kazakstan, Oman, and Russia to construct a pipeline to export Tengiz oil to Russia's Black Sea Coast, the pipeline had not been built owing to both financial and political difficulties. In the spring of 1996, an agreement was reached by Kazakstan, Oman, and Russia which could help break the deadlock on financing the export pipeline for Tengiz oil. According to this agreement, Russia, Kazakstan, and Oman no longer will own the entire shares for the pipeline, but rather the shares also are to be distributed among a consortium of international companies, and there was a major reduction in Oman's share holdings.

At the Karachaganak deposit in the Mangyshlak basin, maximum production was reached in 1991 of 4.2 Mt/yr of oil and 4.5 billion m^3 of natural gas. Production in 1995 was at only about one-half the 1991 peak production levels. In 1992, the United Kingdom's British Gas plc and Italy's Agip S.p.A. won a tender to develop Karachaganak and had spent $50 million on a study of the deposit. In an effort to expedite development at Mangyshlak, the Kazakstan Government approved the request of Russia's main natural gas producing company, Gazprom, to acquire a 15% of the shares of the Karachaganak project through negotiations with the foreign investors. Gazprom controls the transport facilities for exporting Mangyshlak gas to West European markets.

In the area of offshore hydrocarbon development, the states of the FSU bordering the Caspian Sea and Iran by mid-1966

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had not reached a solution regarding development rights, and this lack of agreement is hindering hydrocarbon development in this region. A treaty signed in 1940 between Iran and the Soviet Union regarding rights in the Caspian Sea was no longer considered operative by a number of the states bordering the Caspian Sea.

By yearend 1995, Kazakstan had privatized 78% of its oil and gas companies, turning them into joint-stock companies.

Infrastructure

Kazakstan, which is approximately four times as large as the State of Texas, is the second largest country in land area and fourth most populous to form from the FSU. Kazakstan borders Russia to the north, China to the east, and Kyrgyzstan, Uzbekistan, and Turkmenistan to the south. Although landlocked, Kazakstan borders two major inland seas, the Aral and the Caspian.

Major lakes in Kazakstan include the Alakol, Balkhash, and Zaysan. There are about 4,000 kilometers (km) of navigable river routes. The major rivers are the Ertis, Syrdarlya, Ishim, and Ile; these rivers are important sources of hydroelectric power and provide water for irrigation.

As of 1992, Kazakstan had 14,460 km of railroads, not including industrial lines, and 189,000 km of highways, of which 80,900 km were dirt roads. In 1992, the country had more than 2,800 km of crude oil pipelines and more than 3,400 km of gas pipelines.

Covering a large area, Kazakstan extends from the Volga River to the Altai Mountains and from plains in western Siberia to desert in central Asia. The climate in Kazakstan has wide temperature variations both between the northern and southern parts of the country and between summer and winter temperatures. In the coldest northern regions winter temperatures average -20° C in comparison with -1° C in the south, while in summer the climate in the northern part averages 18° C in comparison with 29° C in the south.

The population of Kazakstan is almost evenly split between Kazakhs and Russians, with Kazaks comprising slightly more and Russians slightly less than 40% of the total population. The remaining ethnic groups are primarily Ukrainians, German Russians, Uzbeks, and Tatars.

Outlook

The outlook for Kazakstan's mineral industry could be quite favorable given the size and variety of its mineral reserves and the fact that Kazakstan has a wide range of mineral commodities that it produces in excess of its consumption needs which could be exported. Kazakstan has the potential to be a much larger supplier of minerals to world markets if it diverts trade away from the FSU and further develops its mineral reserves. A number of Kazakstan's mineral industries will require substantial investment to become major world suppliers, and Kazakstan is involved in capitalizing these industries through foreign management, joint ventures, and privatization.

It still remains to be seen to what extent foreign investors can be attracted to participate in the development of some of Kazakstan's major mineral industries, including its copper and lead-zinc industries. Kazakstan's future as a major world mineral producer will depend in large measure on its ability to attract investment to develop and renovate its mineral industries.

OTHER SOURCES OF INFORMATION

Ministry of Geology and Protection of Natural Resources
Bogenbai Batyr St., 115480091, Almaty, Kazakstan
Telephone: 7 (3272) 616087
Fax: 7 (3272) 611609

Ministry of Industry and Trade
Gogol St., 111
80091 Almaty, Kazakstan
Telephone: 7 (3272) 620063
Fax: 7 (3272) 620806

Ministry of Oil and Gas Industry
Bogenbay Batyr St., 142
80091 Almaty, Kazakstan
Telephone: 7 (3272) 626080
Fax: 7 (3272) 626630/695405

Ministry of Power Engineering and Coal Industry
Bogenbay Batyr St., 142
480091 Almaty, Kazakstan
Telephone: 7 (3272) 626630/626410
Fax: 7 (3272) 626630

State Committee on Statistics and Analysis
Abay Ave., 125
480091 Almaty, Kazakstan
Telephone: 7 (3272) 621461, Fax: 7 (3272) 420824

TABLE 1
KAZAKSTAN: ESTIMATED PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity	1992	1993	1994	1995
METALS				
Alumina	1,100,000	1,000,000	700,000	1,000,000
Arsenic trioxide	2,000	2,000	1,500	1,500

See footnotes at end of table.

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TABLE 1--Continued
KAZAKSTAN: ESTIMATED PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity		1992	1993	1994	1995
METALS--Continued					
Bauxite		3,040,000 2/	3,000,000	2,430,000 2/	3,300,000 2/
Beryllium, metal		NA	NA	NA	NA
Bismuth, metal	kilograms	90,000	90,000	117,000 2/	135,000
Cadmium, metal		1,000	1,000	995 2/	1,000 2/
Chromite		3,500,000	2,900,000	2,020,000 2/	2,400,000
Cobalt, mine output, metal content		1,500	1,500	1,394 2/	1,400 2/
Copper:					
Mine output, metal content		300,000	300,000	285,000 2/	260,000 2/
Metal:					
Smelter, primary		360,000	360,000	326,600	333,000
Refined, primary		360,000	360,000	326,600 2/	333,000 2/
Gold, mine output		24	25	26	26
Iron and steel:					
Iron ore, marketable		17,300,000	13,000,000	10,500,000	15,000,000
Metal:					
Pig iron 2/		4,659,000	3,544,000	2,432,000	2,490,000
Ferroalloys:					
Ferrochromium		400,000	328,000 2/	200,000	350,000
Ferrosilicon		500,000	450,000	350,000	350,000
Silicomanganese		--	--	40,000	20,000
Steel:					
Crude		5,680,000	4,280,000	2,969,000	3,029,000
Finished		4,300,000	3,400,000	2,300,000	2,100,000
Lead:					
Mine output, metal content		130,000	100,000	57,000 2/	40,000
Metal, refined		210,000	190,000	130,000 2/	90,000
Magnesium		3,000	2,000	--	--
Manganese ore, marketable		100,000	150,000	133,000	80,000
Molybdenum, mine output, metal content		600	600	534 2/	282 2/
Nickel, mine output, metal content		10,000	10,000	8,500 2/	9,900 2/
Silver		900	700	506 2/	430 2/
Tin, mine output, metal content		100	50	24 2/	15 2/
Titanium, metal		30,000	30,000	27,200 2/	25,000
Tungsten, metal, W content		100	100	114 2/	228 2/
Vanadium		1,400	1,200	878 2/	924 2/
Zinc:					
Mine output, metal content		260,000	200,000	190,000 2/	190,000
Metal, smelter		260,000	220,000	170,000	170,000
INDUSTRIAL MINERALS					
Asbestos, all grades		300,000	225,000	187,500 2/	150,000
Barite		200,000	200,000	175,000	150,000
Boron		100,000	90,000	80,000	75,000
Cement 2/		6,400,000	4,000,000	2,000,000	1,800,000
Fluorspar		100,000	90,000	80,000	75,000
Phosphate rock		3,500,000	2,500,000	1,740,000	2,000,000
Sulfur:					
Native		200,000	150,000	100,000	90,000
Byproducct		200,000	225,000	250,000	255,000
MINERAL FUELS					
Coal 2/		127,000,000	112,000,000	105,000,000	83,200,000
Natural gas 2/	million cubic meters	8,100	6,700	4,500	4,800
Petroleum, crude 2/		25,800,000	23,000,000	20,300,000	20,600,000
Uranium concentrate, U content		3,000	2,700	2,000	1,800

e/ Estimated. NA Not available
1/ Table includes data available through Aug. 5, 1996.
2/ Reported data.

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TABLE 2
KAZAKSTAN: STRUCTURE OF THE MINERAL INDUSTRY FOR 1995

(Metric tons unless otherwise specified)

Commodity	Major operating facility	Location	Annual capacity e/
Alumina	Pavlodar alumina refinery	Pavlodar	1,200,000.
Arsenic, trioxide	Chimkent polymetallic enterprise and other nonferrous metallurgical enterprises	Shymkent (Chimkent) 1/	3,500.
Asbestos	Dzhetygara complex	Kustanay oblast	1,000,000 total.
Do.	Chilisay complex	Aktyubinsk phosporite basin	
Barite	Karagailinskiy mining and beneficiation complex	Karagaili region	300,000 total.
Do.	Tujuk Mine	Alma-Ata region	
Do.	Achisay polymetallic complex	Kentau region	
Bauxite	Turgai, Krasnooktyabr bauxite mining complexes	Central Kazakhstan	600,000 total.
Beryllium, metal	Ulbinskiy metallurgical plant	Oskemen (Ust-Kamenogorsk) 1/	NA.
Bismuth, metal	Ust-Kamenogorak lead-zinc metallurgical plant	do.	70 total.
Do.	Leninogorsk Lead Smelter	Leninogorsk	
Cadmium	Leninogorsk mining and beneficiation complex	do.	1,200.
Chromite	Donskoy mining and beneficiation complex	Khromtau region	3,800,000.
Coal	Karaganda basin	Central and North Central part of the country	50,000,000.
Do.	Ekibastuz basin	do.	85,000,000.
Do.	Maykuben basin	do.	10,000,000.
Do.	Turgay basin	do.	1,000,000.
Copper, mining, recoverable copper content	Balkhash	Balkhash region	200,000.
Do.	Dzhezkazgan	Dzhezkazgan region	250,000.
Do.	Irtysh	Irtysh region	10,000.
Do.	Leninogorsk	Leninogorsk region	15,000.
Do.	Zhezkent	Zhezkent region	25,000.
Do.	Zyryanovsk mining and beneficiation complexes	Zyryanovsk region	5,000.
Do.	East Kazakhstan copper-chemical complex	Ust-Kamenogorsk region	10,000.
Copper: Metallurgy, metal	Balkhash	Balkhash region	150,000.
Do.	Dzhezkazgan	Dzhezkazgan region	250,000.
Do.	Irtysh smelting and refining complex	Irtysh region	40,000.
Ferroalloys	Aktyubinsk plant	Aqtöbe (Aktyubinsk) 1/	High-carbon 60% ferrochrome, 150,000; medium-carbon 60% ferrochrome, 130,000.
Do.	Yermak plant	Ermak (Yermak) 1/	Ferrosilicon 700,000; ferrosilicochrome, 700,000; high-carbon ferrochrome 400,000.
Gallium	Pavlodar alumina plant	Pavlodar	NA.
Gold	Byproduct of polymetallic ores and native gold mining	Colocated with nonferrous metals mining	30.
Iron and steel:			
Pig iron	Karaganda Steelworks	Karaganda	5,000,000.
Steel, crude	do.	do.	6,300,000.
Steel, finished	do.	do.	4,700,000.
Iron ore, marketable	Sokolovsko-Sarbay, Lisakovskiy mining and metallurgical complexes	Kustanay oblast	25,000,000 total.

See footnotes at end of table.

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TABLE 2- Continued
KAZAKSTAN: STRUCTURE OF THE MINERAL INDUSTRY FOR 1995

(Metric tons unless otherwise specified)

Commodity	Major operating facility	Location	Annual capacity e/
Lead and zinc, mining: (recoverable lead and zinc content of ore)	Achisay	Kentau and Karatau regions	Lead 40,000, zinc 20,000
Do.	Akchatau	Balkhash region	Lead 10,000, zinc 30,000.
Do.	Irtysh	Ust-Kamenogorsk region	Lead 10,000, zinc 50,000.
Do.	Karagaili	Karagaili region	Lead 20,000 zinc 55,000.
Do.	Leninogorsk	Leninogorsk region	Lead 60,000, zinc 120,000.
Do.	Tekeli	Tekeli, Taldi-Kurgan regions	Lead 20,000, zinc 30,000.
Do.	Zhayrem	Zhayrem region	Lead 20,000, zinc 40,000.
Do.	Zyryanovak complexes	Zyryanovak region	Lead 20,000, zinc 40,000.
Do.	East Kazakhstan copper-chemical complex	Ust-Kamenogorsk region	Zinc 15,000 , (lead currently not recovered).
Molybdenum, mining, (recoverable molybdenum content of ore)	Kounrad Mine	Balkhash complex	6,000 total.
	Karaobinskoye deposit	Karaoba region	
Do.	Sayak deposit	Sayak region	
Molybdenum, metal	Akchatau molybdenum metal plant	Dzhezkazgan oblast	NA.
Petroleum and natural gas	Aktyubinskneft	Aktyubinsk region	28,000,000 (total crude oil). 10 million cubic meters (total natural gas).
Do.	Embaneft	Embinskiy District	
Do.	Mangyshalakneft	Mangyshlak Peninsula	
Do.	Tengiz deposit	Tengiz deposit	
Phosphate rock	Karatau production association	Dzhambul and Chimkent oblast	10,000,000 total.
Do.	Chilisay mining directorate	Aktyubinsk phosphorite basin	
Rare metals (columbium, indium, selenium, tellurium).	Aktau complex	Shevchenko	NA.
Do	Belogorsky rare metals plant	Belogorsk	NA.
Do.	Chimkent polymetallic plant	Shymkent	NA.
Do.	Ust-Kamenogorsk lead-zinc plant	Oskemen	NA.
Do.	Akchatau mining and beneficiation complex	Dzhezkazgan oblast	NA.
Rhenium	Balkhash copper mining and metallurgical complex	Balqash (Balkhash) 1/	NA.
Tantalum	Yermak ferroalloy plant	Ermak	NA.
Tin	Akchatau mining and beneficiation complex	Akzhal deposit, Dzhezkazgan oblast	700.
Titanium, metal	Ust-Kamenogorsk titanium-magnesium plant	Oskemen	35,000.
Silver, byproduct	Ust-Kamenogorsk	do.	1,200 total.
Do.	Leninogorsk	Leninogorsk	
Do	Chimkent metallurgical plants	Shymkent	
Uranium, U content	Stepnogosk	Stepnogosk	3,500 total.
Do.	Shevchenko	Shevchenko	
Do.	Taboshara	Taboshara	
Do.	Prikaspiskiy ore enrichment center	Shevchenko	
Do.	Tselinny chemical complex	Stepnogosk	

e/ Estimated. NA Not available.
1/ New names and spellings are given when available. The old name will appear in parentheses the first time the new name is used.

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THE MINERAL INDUSTRY OF

KYRGYZSTAN

By Richard M. Levine

Kyrgyzstan's mineral industry was involved in both mining and processing mineral products with its mining sector exploiting primarily antimony, coal, gold, mercury, rare earths, and tin deposits. Its metallurgical industry led the FSU in the production of two nonferrous metals, mercury, and antimony. Although Kyrgyzstan produced coal and some gas and oil, it was still significantly dependent on imported energy.

In 1995, GDP in Kyrgyzstan fell 6.2% and industrial output fell 12.5% compared with 1994. The fall in both gross domestic product and industrial output was less than one-half the rate of the decline for the previous 4 years.

Reportedly, in 1995 the energy sector comprised 2.4% and the nonferrous metallurgy sector 10.8% of industrial output. Reported production decreases in 1995 were sharper in the mineral sector than for general industrial output as output in the energy sector fell by 25.7% and in the nonferrous metallurgy sector by 16.9% compared with 1994. Reported output of construction materials in 1995 also decreased even more sharply than the average decrease in industrial output with cement output falling by 27.4% compared with 1994 to 310,000 t and production of other construction materials showing similar or steeper declines.

However, the production trends were not consistent within sectors. Reportedly, while coal production fell by 36.5% compared with 1994 to 474,000 t, natural gas production fell by only 8.5% to 35.7 m^3, and oil production increased by 0.3% to 88,500 t.

Kyrgyzstan developed a plan to begin privatizing its mineral enterprises beginning in 1995, except gold-mining enterprises, with the aim of turning these enterprises into joint-stock companies. Joint-stock companies in the FSU have taken varying forms and often include a combination of Government and private ownership with the issued stock initially either sold or distributed to workers, management, and national and local governments.

The major organization involved in mineral production is the state concern Kyrgyzaltyn comprised of five operating mining and metallurgical complexes and three under development. Kyrgyzaltyn administers the Kara Balta complex that had engaged in uranium mining. Kara Balta currently engages in gold refining and production of uranium concentrates and molybdenum compounds and is developing molybdenum, tin, and tungsten deposits.

In addition, Kyrgyzaltyn administers the Makmalzoloto gold mining complex, the Khaydarkan mercury mining and metallurgical complex, the Kadamzhay antimony production complex, and the Kyrgyz chemical and metallurgical complex mining and processing rare earths.

In 1995, Kyrgyzaltyn was engaged in developing the Kumtor gold mining joint venture with Canada's Cameco Corp. and the Dzheruy gold mining joint venture with the United States' Morrison Knudson Co. Krgyzaltyn was also engaged in a number of other gold development projects both independently and as joint ventures including the Kara Balta firm of Kyrgyzaltyn engaging in a joint venture with Swiss, Australian, and Malaysian firms to develop the Taldy Bulak Levoberezhnyy lode deposit with reportedly 54 tons of gold reserves. Annual production was planned at about five (t/yr) of gold from this joint venture. Total reserves in the Taldy Bulak field were reportedly between 200 t and 250 t.

The Kadamzhay antimony metal plant, the only producer of antimony metal in the FSU, with a capacity to produce 20,000 t/yr of metal and trioxide, was experiencing increasing difficulty in obtaining high quality raw materials. Its main source of such raw material was the Sakha/Yakutia region of Russia, and plans called for shipping a significant percentage of the Sakha concentrates to new antimony production facilities being developed in Russia.

Antimony is one of Kyrgyzstan's important exports with exports to the FSU going to Belarus, Kazakstan, Russia, and Ukraine and outside the FSU to, Germany, Switzerland, the United Kingdom, and other foreign countries. Antimony produced at Kadamzhay reportedly is free of selenium and therefore is suitable for a number of technical purposes requiring high purity antimony.

The Khaydarkan mining and metallurgical complex, which produces mercury and mercury compounds and antimony and fluorspar concentrates, has the capacity to produce annually 1,000 t of mercury; 5,000 t of fluorspar concentrate; and more than 4,000 t of antimony concentrate.

Production had fallen sharply at Khaydarkan since the breakup of the Soviet Union. Khaydarkan in 1995 was estimated to have increased mercury production slightly to 380 t compared with 378 t in 1994. In 1995, it was planned to increase fluorspar concentrate production to 850 t compared with 834 t in 1994. Plans for 1996 called for further increasing fluorspar concentrate production by

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working lower levels of the Zapadnaya mine.

The Khaydarkan complex processes raw materials from Russia and Tajikistan and exports the majority of its products. In 1995, Khaydarkan exported 87% of its mercury output, mainly to Russia, Kazakstan, and Azerbaijan.

Plans call for a large increase in mercury production at Khaydarkan of between 70% and 75%. Khaydarkan also plans to improve its mining technology, to begin processing scrap containing mercury, and to begin producing antimony. Previously, when Khaydarkan received antimony-mercury concentrate from Tajikistan, it extracted the mercury and sent the antimony on to the Kadamzhay antimony plant in Kyrgyzstan for processing.

Kyrgyzstan was still seeking financing to develop the Sary Dzhaz tin and tungsten deposit reportedly containing over 150,000 t of tin and 100,000 t of tungsten as well as molybdenum.

The Kyrgyz Chemical and Metallurgical complex which produces a range of rare earth metals including dysprosium, erbium, europium, gadolinium, lutetium, neodymium, thulium, ytterbium, and their compounds and alloys reported working at only 20% of capacity in 1995. In 1993 and 1994, the plant was almost shut down as orders ceased. Ores at the Kyrgyz complex were practically depleted and the complex was processing raw material mainly from Kazakstan and Russia. The Kyrgyz complex reportedly was engaged in agreements with Russia to supply raw materials and was planning a joint venture to mine a rare earth deposit in Kazakstan.

The complex's main customers during the Soviet period had been in Belarus, Kazakstan, Lithuania, Russia, Ukraine, and Uzbekistan, but shrinking demand from these countries forced the Kyrgyz plant to export beyond the FSU to customers in Austria, Japan, and the United Kingdom to which in 1995 it sold more than 90% of its output. Reportedly, in 1995, the Kyrgyz Chemical and Metallurgical complex sold 10 t of yttrium oxide and 800 kilograms (kg) of metallic dysprosium to the United Kingdom and 150 kg of holmium oxide to Japan. The plant reportedly also sold 470 kg of yttrium alloy to Kazakstan and 170 kg of cerium oxide to a Russian buyer from Severo-Dvinsk.

With the breakup of the Soviet Union, Kyrgyzstan was cut off from consumers, fabricators, and processors of most of its mineral products, and its mineral industry had to sharply curtail output of many mineral products. To alleviate this situation, the Government of Kyrgyzstan placed all of its major mineral enterprises under the administration of a newly formed state mineral concern, Kyrgyzaltyn for the purpose of expending it major effort to develop the gold mining sector.

Kyrgyzstan was one of the most successful of the new countries of the FSU in attracting foreign investment in its gold-mining sector. Kyrgyzstan, however, has not yet attracted major foreign investment in its other mineral industries and their survival could depend on their ability to attract foreign investment and enter world markets.

OTHER SOURCES OF INFORMATION

Kyrgyzaltyn
55 Manas St.
720001 Bishkek, Kyrgyzstan
Telephone: 7-3312 220 941
Fax: 7-3312 227 228

Ministry of the Economy
Erkindid Prospekt 58
720345 Bishkek, Kyrgyzstan
Telephone: 7-3312-22-89-22
Fax: 7-3312-22-74-04

State Commission on Foreign Investment and Economic Assistance
(GOSKOMINVEST)
Erkindik Prospekt 58A
720874 Bishkek, Kyrgyzstan
Telephone: 7-3312-22-32-92/22-12-52
Fax:7-3312-22-03-63/62-01-88
Telex: 245169 ASKAR SU

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TABLE 1
KYRGYZSTAN: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity		1992	1993	1994	1995
Antimony:					
Mine ouput, Sb content		2,000	1,600	1,400	1,400
Metal		11,000	11,000	9,000	9,000
Cement 2/		1,100,000	700,000	400,000	310,000
Coal 2/		2,200,000	1,700,000	800,000	474,000
Fluorspar concentrate		850	850	834 2/	850
Gold	kilograms	1,000	1,000	835	850
Mercury:					
Mine output, Hg content		300	300	300	300
Metal		400	400	378 2/	380 2/
Natural gas 2/	million cubic meters	100	40	40	36
Petroleum, crude 2/		100,000	100,000	85,900	88,500

1/ Estimated based on information available through July 10, 1996.

2/ Reported data.

TABLE 2
KYRGYZSTAN: STRUCTURE OF THE MINERAL INDUSTRY FOR 1995

(Metric tons unless otherwise specified)

Commodity	Major operating companies	Location of main facilities	Annual capacity e/
Antimony:			
Metal content of ore	Kadamzhay and Khaydarkan complexes	Kadamzhay, Khaydarkan regions,	2,400
Metal	Kadamzhay metallurgical complex	Kadamzhay region	20,000
Coal	7 underground mines, 5 open pits	Southwestern, central, and northeastern parts of country	2,200,000
Cement	Kantakiy cement plant	Kant	1,500,000..
Fluorspar	Khaydarkan mining and metallurgical complex	Khaydarkan deposit	5,000 (fluorspar concentrate).
Gold	Kyrgyzstaltyn State Concern	Makmal deposit, (Kumtor, Dzheruy Taldy-Bulak Levoberezhny deposits under deve;pment)	3 (development of new deposits could raise annual capacity to 22 to 25 t/yr in 5 to 6 years).
Mercury:			
Metal content of ore	Khaydarkan mining and metallurgical complex	Khaydarkan deposit	700
Metal	Do	Khaykdarkan	1,000
Petroleum and Natural gas million cubic meters	Approximately 300 wells: major deposits include Changyr-Tashskoye Izbaskentskoye, Mayli-Suyskoe, Chigirchikskoye Karagachskoye, Togap-Beshkentskoye, Suzaskoye	Western Kyrgyzstan near Mayli-Say	150,000 (petroleum). 100 (natural gas).
Rare earths	Kyrgyz mining and metallluargical complex	Aktyuz deposit	NA.

e/ Estimated. NA Not availabale.

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THE MINERAL INDUSTRY OF

LATVIA

By Richard M. Levine

Latvia has a small mineral industry engaged primarily in mining peat and industrial minerals, including clays, dolomite, gypsum, limestone, sand for glass and brick production, and sand and gravel for construction uses. The country has a steel mill in Lipaija that has the capacity to produce 550,000 t of crude steel and almost 900,000 t of rolled products.

Latvia supplies about 85% of the raw materials for its cement industry. All cement raw material resources are fairly shallow and the overburden is primarily glaciated material. In the case of dolomite, gypsum, and sand, surpluses potentially could be produced. All mining is from surface mines. Inadequate reclamation work at surface operations has created severe environmental problems.

In the mid-1980's, reportedly, there were three clay mines producing clay suitable for light concrete aggregates, 14 enterprises producing bricks and drainage pipes, 85 peat deposits under exploitation producing peat for both fuel and agricultural use, a gypsum mining and processing complex, a number of dolomite mines and 22 sand and gravel pits.

Except for the output from these mineral industries, Latvia is dependent on imported fuels and other minerals for practically its entire mineral supply. Its steel mill at Lipaija uses scrap metal and imported iron ore.

In 1995, GDP was estimated to have increased by 1% compared with 1994, having also increased in 1994 by 2% compared with 1993. Nevertheless, output for a number of mineral industries reportedly decreased. In 1995 crude steel output reportedly decreased 16% to 279,000 t compared with 332,000 t in 1994. According to the Central Statistical Bureau of Latvia, production of cement fell from 244,416 t in 1994 to 203,786 t in 1995, limestone from 392,500 t in 1994 to 324,000 t in 1995, and peat from 646,500 t in 1994 to 421,300 t in 1995. Production, however, of gypsum increased from 61,026 t in 1994 to 78,813 t in 1995, and of sand and gravel from 75,553 t in 1994 to 90,907 t in 1995.

In 1995, Russia continued to be Latvia's major supplier of fuel and energy, and Russia also provided Latvia with a major source of foreign currency earnings from the transit and re-export of Russian oil and petroleum products. Latvia's port of Ventspils on the Baltic Sea was the only port on the Baltic Sea used to export Russian oil and petroleum products.

At yearend 1995, the Latvian Government embarked on a new reform policy intended to simplify the privatization process and remove restrictions on foreign ownership of natural resources with plans calling for putting all state enterprises including the energy utilities up for sale in 1996. Plans also called for the privatization of the port of Ventspils, a major port for exporting oil, potash, and other minerals from the former Soviet Union (FSU). Among the major Latvian enterprises slated to be privatized in 1996 are the state electrical utility Latvenergo and the Latvian oil transport complex Ventspils Nafta.

Latvia has large peat reserves, and there is an interest in further developing these reserves for use in both agriculture and domestic and regional heating systems. Although a number of small oil deposits have been found on and offshore, there has been no development of these deposits. Discussions were underway at yearend to amend restrictions against foreign exploitation of natural resources. Such an amendment could increase the potential for development of Latvian on and offshore petroleum resources.

Latvia's geological structure is amenable to gas storage. Its current storage capacity is 5 billion m^3 and maximum potential capacity is estimated to be 50 billion m^3. Russia has discovered natural gas in the Barents Sea, and this storage capacity could potentially be used as a midway storage point for markets in Western Europe.

OTHER SOURCES OF INFORMATION

Central Statistical Bureau of Latvia
1, Lacplesa St.
Riga, Latvia
Telephone: 270-126
Fax: 371-78-30137/703-648-7737

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TABLE 1
LATVIA: PRODUCTION OF MINERAL COMMODITIES e/ 1 /

(Metric tons unless otherwise specified)

Commodity		1992	1993	1994	1995
Cement		400,000	300,000	244,416 2/	203,786 2/
Clays	cubic meters	700,000	500,000	500,000	500,000
Gypsum		100,000	80,000	61,026 2/	78,813 2/
Limestone		700,000	500,000	392,500 2/	324,000 2/
Peat		700,000	700,000	646,500 2/	421,300 2/
Sand and gravel		90,000	80,000	75,553 2/	90,907 2/
Silica sand, industrial:					
For silica bricks	cubic meters	50,000	40,000	40,000	40,000
For glass	do.	30,000	25,000	25,000	25,000
Steel, crude		246,000 2/	300,000 2/	332,000 2/	279,000 2/

e/ Estimated

1/ Table includes estimates and data based on information available through July 1, 1996.

2/ Reported figure.

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THE MINERAL INDUSTRY OF

LITHUANIA

By Richard M. Levine

The mining industry of Lithuania extracted peat and industrial minerals, including clays and sand and gravel. The industrial minerals industry was of significant magnitude as Lithuania ranked fourth among the republics of the FSU in the production of lime, fifth in the production of cement, and sixth in the production of bricks. There were more than 290 enterprises engaged in the production of industrial minerals, including nitrogenous fertilizer, and more than 240 sand and gravel deposits under exploitation. The country's peat production was used in agriculture as compost and litter.

The Ignalina nuclear powerplant in Lithuania, a graphite-moderated pressure-tube reactor, provides a large percentage of the country's electric generation capacity. Lithuania also has the Baltic states only oil refinery at Mazheikiai with a capacity to produce over 13 million metric tons per year (Mt/yr) of petroleum products.

In 1995 GDP was estimated to have increased by 3% compared with 1994; in 1994 the country experienced a 2% increase in GDP. In 1995 mixed results were reported in the mineral sector, with increased production reported for ammonia and sand for glass and decreased production for cement, peat, refinery products, and sand and gravel. According to the Lithuanian Statistics Department, in 1995 ammonia production (nitrogen content) reportedly increased to 442,200 metric tons (t) compared with 277,200 t in 1994, while cement production in 1995 reportedly decreased to 649,000 t compared with 736,000 t in 1994. Peat production in 1995 decreased to 214,000 t compared with 411,000 t in 1994 and production of petroleum refinery products in 1995 decreased to 857,600 t compared with 1,034,800 t in 1994.

In 1995, construction was finished of the first stage of a petroleum and petroleum products loading terminal at Butinge on the Baltic Sea. The terminal is to have a designed import and export capacity of 8 Mt/yr of oil and 2.5 Mt/yr of petroleum products. The terminal was designed with the assistance of the United States firm Fluor Daniel Williams Brothers, and is being built by Lithuanian companies with credit being extended by the United States Export-Import Bank.

Lithuania with its large production of sand, gravel, limestone, dolomite, chalk, and clay is self-sufficient in raw materials to produce construction materials, but is almost entirely lacking in metals and mineral fuels. Resources that are being considered for development include an iron ore deposit of fine- grained magnetite that exceeds 50% iron content and a gypsum-anhydrite deposit.

OTHER SOURCES OF INFORMATION

Statisikos Departmentas
Gedimino Pr. 29
2746 Vilnius, Lithuania

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TABLE 1
LITHUANIA: PRODUCTION OF MINERAL COMMODITIES e/ 1/

(Metric tons unless otherwise specified)

Commodity		1992	1993	1994	1995
Ammonia, nitrogen content		275,000	250,000	277,200 2/	442,200 2/
Cement		1,500,000	1,000,000	736,000 2/	649,000 2/
Clays:					
Brick	thousand cubic meters	700,000	500,000	500,000	500,000
Concrete aggregates	do.	300,000	200,000	200,000	200,000
For cement		800	600	600	500
Limestone		5,000,000	4,000,000	3,500,000	3,000,000
Peat		400,000	400,000	411,000 2/	214,000 2/
Petroleum; refinery products		1,000,000	1,000,000	1,034,800 2/	857,600 2/
Sand and gravel	cubic meters	15,000	30,000	47,600 2/	32,000 2/
Sand, for glass	do	80,000	60,000	33,100 2/	46,700 2/

e/ Estimated.
1/ Table includes estimates based on information available through June 30, 1996.
2/ Reported figure.

TABLE 2
LITHUANIA: STRUCTURE OF THE MINERAL INDUSTRY FOR 1995

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies	Location of main facilities	Annual capacity e
Ammonia, nitrogen content		Jonava nitrogenous fertilizer plant	Jonava	400
Cement		Akmyantsementas enterprise	Akmyane	2,500
Clays (for brick production	cubic meters	Production at 19 deposits with the largest production facilities: The Daugelskoye plant exploiting the Daugelai deposit,	Daugelai	1,500,000 (total for 19 deposits).
Do		The Ignalinskoye plant exploiting the Dinsa deposit	Ignalina region	
Do.		The Tauragskoye enterprise exploiting the Taurage deposit	Taurage region	
Clays (for concrete aggregates)		Krunay deposit	Krunay region in central Lithuania	500.
Clays (for cement)		Saltiniskiai deposit	Saltiniskiai region	2,000.
Limestone		Karpenai deposit for cement production	Karpenia region	8,000.
Peat		Production at 11 eneterprises exploiting 55 deposits Largest eneterprises are: Siauliai exploiting Didisis-Tiryalis and Sulinkiu deposits	Siauliai region	350.
Do.		Ezherelskoye exploiting Ezherelis and Pales deposits	Ezherelis region	400.
Do.		Ionovskoye exploiting Paraistis and Disisis-Raystas deposits	Paraistis region	300.
Do.		Baltoyi-Bokeskoye exploiting Baltoyi and Vokeskoye deposits	Baltoyi-Boke region	300.
Petroleum products		Mazheikiai petroleum refinery	Mazheikiai	12,000.
Sand and gravel	million cubic meters	246 deposits under exploitation. Largest eneterprises: Trakaijskoye association exploiting Serapinshkes deposits	Trakai region	20 (total for 246 deposits).
Do.	Do	Rizgonskiy plant and Yurbarkskiy plant exploiting Rizgonys and Kalnenay deposits	Rizgonys region	
Sand (for glass)		Anyksciai deposit	Anyksciai	150.

e/ Estimated.

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THE MINERAL INDUSTRY OF

MACEDONIA

By Walter G. Steblez

Following secession from Yugoslavia in early 1992, Macedonia encountered serious difficulties with respect to international recognition, owing to Greece's demand that the term "Macedonia" be applied only to the northern province of Greece bordering with the former Yugoslav Republic of Macedonia. The political dispute with Greece over the "Macedonia" eponym resulted in a de facto trade embargo because of Greece's reported closure of its border to Macedonia coupled with the international economic sanctions placed against Serbia and Montenegro with which Macedonia has a common border.

The Republic of Macedonia had been a major producer of minerals in the former Yugoslavia. The country's output of major minerals in 1990 (the last year for which comparative statistical information was available) as a percent of total output for Yugoslavia, amounted to 12.3% for copper ore, and 36.9% for lead and zinc ore. Output of smelter and refined lead amounted to 25.6% and 26.7%, respectively, for the same period; silver amounted to 14.7%; and zinc smelter secondary and zinc refined output was 100% and 45.3%, respectively, of total production. Additionally, steel (electric furnace) production was 16.5% of total output. With respect to industrial minerals, Macedonia's production of bentonite, dolomite, gypsum, and pumice in 1990 amounted to 65.3%, 58.1%, 10.2%, and 48.7%, respectively, of the former Yugoslavia's total production.

The country's production of lignite in 1990 represented 10.4% of the former Yugoslavia's total output that year but was the only fossil fuel that was produced. The dislocation of the former Yugoslavia's mineral industry and commerce in 1992 continued through the end of 1995 resulting in apparently significant shortfalls in minerals production in Macedonia as well as in other former constituent republics.

Although the primary concern of the Government of acedonia was reportedly the issue of international recognition, apparently some effort continued to be directed at maintaining levels of industrial production that would ensure minimally acceptable levels of employment.

The production table for Macedonia was compiled from data presented in a variety of statistical publications of the former Yugoslavia through 1991. The major portion of the country's production statistics, however, was obtained from "Industrijska Proizvodnja," an annual statistical compendium published in Belgrade through 1990 that presented production data by constituent federal republics, as well as by total output for the former Yugoslavia. *(See table 1.)*

Owing to the de facto trade embargo that developed around Macedonia, very little detailed official information concerning foreign trade for 1993 was available.

Table 2 lists the apparent administrative bodies as well as subordinate production units of the main branches of the country's mineral industry in 1993. *(See table 2.)*

Apart from reports concerning several mineral industry closures at yearend, available reports dealing with the country's mineral production described substantial idle capacities in 1994 in both the iron and steel and nonferrous metals sectors of the country's mineral industry. Owing to the depletion of its coal stocks and inability to obtain supplies from outside the country, Fenimak, the country's nickel producer, announced the closure of its operations at yearend 1993.

Macedonia's inland system of ways and communications consisted of railroads, highways and waterways. Although information concerning the total lengths of the railroad and inland waterway systems was not yet available, the highway and road system reportedly consisted of 10,591 km of paved, gravel, and earth-surfaced road, of which 5,091 km was paved, 1,404 km was gravel, and 4,096 km was earth-surfaced. The country was entirely landlocked and possessed neither a merchant marine fleet nor pipelines for carriage of natural gas and petroleum.

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TABLE 1
MACEDONIA: APPARENT PRODUCTION OF MINERAL COMMODITIES 1/ 2/

(Metric tons unless otherwise specified)

Commodity		1991	1992	1993	1994	1995 e/
METALS						
Aluminum: Metal, ingot, primary and secondary		5,000	4,000	2,000	2,000	2,000
Cadmium, smelter output	kilograms	160	110	100	100	
Chromite:						
Ore, gross weight		6,000	6,000	5,000	5,000	5,000
Concentrate (produced largely from imported ores)		14,000	10,000	3,000	3,000	3,000
Copper: Mine and concentrator output:						
Ore, gross weight	thousand tons	3,850 3/	3,000	2,500	2,000	2,000
Cu content of ore		9,200	7,200	7,000	6,500	6,500
Concentrate, gross weight		36,000	30,000	25,000	20,000	20,000
Iron and steel:						
Iron ore:						
Gross weight	thousand tons	25,000	20,000	20,000	20,000	20,000
Fe content of ore		1,000	1,000	1,000	1,000	1,000
Concentrate		30,000	15,000	15,000	15,000	15,000
Pellets		25,000	10,000	10,000	10,000	10,000
Agglomerate		20,000	5,000	5,000	5,000	5,000
Metal:						
Ferroalloys:						
Ferrochromium, low C		3,360 3/	3,960 3/	4,380 3/	3,160 3/	3,200
Ferrosilicochromium		2,000	1,500	--	--	--
Ferrosilicon		35,000	30,000	20,000	15,000	15,000
Silicon		1,800	1,000	1,000	1,000	1,000
Total		42,160	36,460	25,380	19,160	19,200
Pig iron		50,000	20,000	20,000	20,000	20,000
Steel; crude:						
From oxygen converters		65,000	42,000	37,000	30,000	30,000
From electric furnaces		80,000	160,000	100,000	60,000	60,000
Total		145,000	202,000	137,000	90,000	90,000
Semimanufactures		45,000	20,000	20,000	20,000	20,000
Lead:						
Mine and concentrate output, ore gross weight (Pb, Zn ore)		900,000	400,000	400,000	400,000	400,000
Smelter, primary and secondary		18,000	10,000	10,000	10,000	10,000
Refined, primary and secondary		14,000	8,000	8,000	8,000	8,000
Nickel: Metal, Ni content of FeNi		--	450	3,500	3,500	3,500
Silver	kilograms	12,000	10,000	10,000	10,000	10,000
Zinc: Metal:						
Zn, smelter, primary		50,000	30,000	30,000	30,000	30,000
Zn, refined, primary and secondary:						
Smelter		7,370 3/	7,000	7,000	7,000	7,000
Electrolytic		32,000	25,000	25,000	25,000	20,000
INDUSTRIAL MINERALS						
Cement 3/	thousand tons	606 r/	516 r/	499 r/	486 r/	500
Clays, bentonite 3/		45,000	40,000	35,000	30,000	30,000
Diatomite		4,000	5,000	5,000	5,000	5,000
Feldspar		30,000	20,000	15,000	15,000	15,000
Gypsum:						
Crude		44,000	30,000	30,000	25,000	25,000
Calcined		11,000	7,000	7,000	5,000	5,000
Lime		40,000	20,000	20,000	20,000	20,000
Pumice and related materials: Volcanic tuff		200,000	100,000	75,000	75,000	75,000
Sand and gravel, excluding glass sand	thousand cubic meters	150	130	130	130	130
Stone, excluding quartz and quartzite: Dimension, crude:						
Ornamental	square meters	400,000	300,000	200,000	200,000	200,000
Crushed and brown, n.e.s.	thousand cubic meters	700	400	400	400	400
Other	cubic meters	15,000	10,000	10,000	10,000	10,000
Sulfur: Byproduct of metallurgy	thousand tons	8	6	6	6	6

See footnotes at end of table.

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TABLE 1--Continued
MACEDONIA: APPARENT PRODUCTION OF MINERAL COMMODITIES 1/ 2/

(Metric tons unless otherwise specified)

Commodity		1991	1992	1993	1994	1995 e/
INDUSTRIAL MINERALS --Continued						
Talc:						
Crude		20,000	15,000	10,000	10,000	10,000
Washed		17,000	10,000	7,000	7,000	7,000
MINERAL FUELS AND RELATED MATERIALS						
Lignite 3/	thousand tons	6,922 r/	6,494 r/	7,706 r/	6,830 r/	6,800
Petroleum refinery products	thousand 42-gallon barrels	12,000	10,000	8,000	8,000	8,000

e/ Estimated. r/ Revised.
1/ Table includes data available through Mar. 1996.
2/ In addition to commodities listed, common clay and diatomite also are produced, but available information was inadequate to make reliable estimates of output levels.
3/ Reported figure.

TABLE 2
MACEDONIA: STRUCTURE OF THE MINERAL INDUSTRY FOR 1995

(Thousand of metric tons unless otherwise specified)

Commodity	Major operating companies 1/	Location of main facilities	Annual capacity
Cement	Azbestcementa "Usje" Preduzece za Proizvodnju Cementa	Plant at Skopje, Macedonia	2,190
Chromite, concentrate	Jugohrom, Hemijsko-Elektrometakursk Kombinat	Concentrator at Radusa, Macedonia	150
Copper ore	Bucim, Rabotna Organizacija za Rudarstvo i Metalurgija za Baker	Mine and mill at Bucim, near Radovis, Macedonia	7,000
Ferroalloys	Jugohrom, Hemijsko-Elektrometalurski Kombinat	Plant at Jegunovce, Macedonia	80
Iron ore	Skopje Rudnici i Zeljezarnica Skopje	Mines at Tajmiste, Demir Hisar, and Damjan, Macedonia	1,000
Lead-zinc ore	Prepobotuvacki, Kombinat Zletovo-Sas Sase, Rudnici za Olovo i Cink	Mine and mill near Kamenica, Macedonia	300
Do.	Zletovo, Rudnici za Olovo i Cink	Mine and mill near Probistip, Macedonia	700
Lead metal	Zletovo, Topilnica za Cink i Olovo	Imperial Smelter at Titov Veles, Macedonia	40
Do.	do.	Refinery at Titov Veles, Macedonia	40
Nickel:			
Ore	Feni-Rudnici i Industrija za Nikel, Celi Antimon	Mine and opencast mine near Kavadarci, Macedonia	2,300
Metal	do.	Ferronickel plant at Kavadarci, Macedonia	161
Pig iron	Skopje, Rudnici i Zeljezarnica Skopje	5 Elkem electric furances at Skopje, Macedonia	430
Steel, crude	do.	Plant at Skopje, Macedonia	980
Zinc metal	Zletovo, Topilnica za Cink i Olovo	Imperial Smelter plant and refinery at Titov Veles, Macedonia	65

1/ Nickel in ferronickel.

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MALTA

By Harold R. Newman

TABLE 1
MALTA: ESTIMATED PRODUCTION OF MINERAL COMMODITIES 1/

Commodity 2/		1991	1992	1993	1994	1995
Limestone	thousand metric tons	2,350	2,300	2,200	2,200	2,000
Salt	metric tons	30	30	30	30	30

1/ Table includes data available through Mar. 1996.
2/ In addition to listed commodities, a small amount of cement, fertilizer, lime, and plaster is produced, but available information is inadequate to make reliable estimates of output levels.

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THE MINERAL INDUSTRY OF

MOLDOVA

By Richard M. Levine

Moldova has a small mineral industry, the output of which, according to Soviet statistics, accounted for less than 1% of the value of Moldova's industrial output in the mid-1980's.

The mineral industry was primarily engaged in the mining and production of industrial minerals, including cement, dimension stone, gypsum, limestone, and sand and gravel. There were more than 100 deposits in Moldova being exploited for industrial minerals. Moldova also has a steel minimill in Rybnitsa. Moldova had been receiving more than 90% of its industrial raw materials and more than 98% of its fuels from other regions of the FSU.

In 1995, the Moldovan economy appeared to experience some revival as the GDP increased by an estimated 2% compared with 1994 after having decreased by 31% in 1994. Industrial output in 1995 compared with 1994 fell by 6% which was about the same rate of decline as in 1994. In 1995, production of construction materials fell by 17% compared with 1994 because of a slowdown in construction. There was a decrease in output for certain items such as bricks, expanded clay aggregates, glassware, reinforced concrete blocks, and wall tile ceramics. According to the Moldovan Department of Statistics, gypsum production in 1995 reportedly decreased to 13,600 metric tons (t) compared with 14,600 t in 1994; crude steel production in 1995 reportedly fell to 299,000 t compared with 453,000 t in 1994; sand and gravel production in 1995 reportedly decreased to 376,100 t compared with 395,200 t in 1994; and lime production in 1995 reportedly decreased to 10,800 t compared with 15,900 t in 1994. Cement production, however, reportedly increased in 1995 to 48,800 t compared with 39,100 t in 1994.

Denationalization and privatization continued in industry with the share of firms undergoing these processes having increased from 38% in 1994 to 62% in 1995.

Moldova was involved in a 2-year program financed by the Moscow-based Tokobank in conjunction with the Deutsche Bank to upgrade output and to double its steelmill's current capacity of 710,000 t/yr of crude steel and 500,000 t/yr of rolled products. The goal also is to bring output up to world quality standards to increase exports. In 1995 over 90% of the mill's output was exported, with exports going to China, Egypt, Finland, Germany, Hong Kong, Israel, Korea, Taiwan, and Turkey.

Moldova in 1995 remained almost entirely dependent on outside sources for its mineral raw material requirements. Moldova will continue to be dependent on finding outside sources of supply for minerals and was seeking to expand its suppliers beyond the FSU. It was also seeking to increase customers for its mineral output outside the FSU.

OTHER SOURCES OF INFORMATION

Department of Statistics of the Republic of Moldova
Bulv. Stefan cel Mare, 124
27701, Chisinau, Molodova
Telephone: 22-16-14, Fax: 26-11-19

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THE MINERAL INDUSTRY OF

THE NETHERLANDS

By Harold R. Newman

In terms of world production, the Netherlands was not a major producer of metallic or nonmetallic minerals or mineral products; however, it was very important as a regional producer of natural gas and petroleum for the European market and played a major role as a transshipment center for mineral materials entering and leaving continental Europe.

Rotterdam, in particular, remained extremely important as a shipping and storage center. With the ever expanding inland transportation systems, goods entering or leaving Rotterdam can originate in or be destined for almost anywhere in continental Europe. However, the facilities at Rotterdam and surrounding area could not accomodate any increase in traffic without upgrading and expansion.

Environmental policy in the Netherlands was the responsibility of the Ministry of Housing, Planning, and the Environment, and protecting and upgrading the quality of the environment was of high priority to the citizens of the Netherlands. In addition to protecting the environment, the Dutch were also concerned with remedying the practices of the past.

Production of mineral commodities generally remained the same or dropped slightly during 1995. The high cost of social benefits contributed to the production costs of Dutch products making them less competitive on the world market. Government proposals to limit social security and health spending in order to help stimulate job growth and the economy in general were met with great resistance by the general public. *(See table 1.)*

Trade data for 1994 and 1995 were not available for the compilation of this report, however little was expected to have changed from previous years, except for volume and value. Based on value, the five main destinations for exports and reexport from the Netherlands in 1993 were Germany, Belgium/ Luxembourg, France, the United Kingdom, and Italy, respectively. The United States was sixth on the list of destinations for exports and reexports. In 1993, the five main sources of all imports were, based on value, Germany, Belgium/Luxembourg, the United Kingdom, the United States, and France, respectively.

Trade balances in 1993 with leading trading partners in million dollars were: Germany (+) 10,745; Belgium/Luxembourg (+) 2,828; the United States (-) 4,485; the United Kingdom (+) 987; and France (+) 5,303.

The only mining operations left in the Netherlands in 1995 were the extraction of peat, salt, and sand and gravel. The metal processing sector relied almost exclusively on imported raw materials, not only ores and concentrates, but also on scrap and refined and unrefined metals. *(See table 2.)*

Production of primary aluminum in the Netherlands by Hoogovens Aluminium BV had been declining steadily for the past few years while the growth of the secondary aluminum industry has been increasing. The production of secondary aluminum consumes about 5% of the energy required to produce primary aluminum.

Hoogovens investigated the possibility of building its own powerplant to serve its aluminum and steel operations. A study had indicated that the organization could save as much as 20% on its energy costs if it were to build a 1,000-megawatt powerplant. This would be equivalent to 6% of the country's electricity capacity.

The steel division of the Hoogovens Group, Hoogovens IJmuiden BV, was Europe's sixth largest steel producer. The company's reorganization plan took effect in mid-1995. The steel division was divided into five separate business-oriented organizations, each responsible for its own financial results. In addition to the marketing, sales, and production units, a product/market unit was created to focus more attention on customer-driven innovation. To increase the international spread of the market, an International Business Development directorate was set up during this reorganization to build up sustainable positions on growth markets outside of Europe.

Natural gas was the most important mineral fuel produced in the Netherlands. In addition to domestic consumption, the gas was exported and provided the equivalent of about US$4 billion each year in export sales. The gas was produced from 30 offshore facilities in the North Sea and 20 onshore facilities. Gasunie, the gas distribution organization, announced that companies would now be allowed to deplete gasfields over 10 years instead of the previous 14 years and at a maximum load factor of 90% instead of the previous 67%.

Also, the Dutch Government announced that new rules would be in effect for the 1995 round of offshore exploration licensing. The new rules lowered the state's share in production licenses from 50% to 40% and no royalties would be levied on any new production if gas output was below 800 million cubic meters. Companies claimed that the new measures would not be effective in boosting exploration because they applied only to new licenses and not to those already existing. Energy company applicants were to be requested to submit a geologic report and to sign a pact with the Government on environmental protection.

In October 1995, the Dutch Parliament passed a bill to introduce an energy tax. The tax would be imposed on the

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use of electricity and a number of other fuels, but not on fuels used for transport, renewable energy sources, and fossil fuels used for cogeneration of heat and power. Large-scale energy users, which may include metal- production and processing facilities, may negotiate exemptions from the Government, or may find it more cost-effective to receive electricity from a supplier who uses renewable energy sources for which a lower taxation rate is applied.

TABLE 1
NETHERLANDS: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity 2/		1991	1992	1993	1994	1995 e/
METALS						
Aluminum metal:						
Primary		264,000	235,000	229,000 r/	219,382	220,000
Secondary		114,000 3/	151,000 3/	150,000 3/	175,300 e/	191,500
Cadmium metal, primary		549	594	526	307	300
Iron and steel:						
Ore, sintered (from imported ore) e/		3,950,000 4/	4,100,000	4,000,000 r/	3,021,500	4,246,400
Metal:						
Pig iron including blast-furnace ferroalloys (if any)		4,696,500	4,849,000	5,404,000	5,443,400	5,560,100
Steel:						
Crude		5,171,000	5,439,000	6,001,000	6,174,000	6,409,000
Semimanufactures e/		4,910,000 4/	5,194,000	5,812,000	5,948,000	5,500,000
Lead metal, refined, secondary		33,700	24,300 r/	24,200	25,000 e/	25,000
Tin metal:						
Primary		4,800	--	--	--	--
Secondary		200	200	--	--	--
Total		5,000	200	--	--	--
Zinc metal, primary		211,082 r/	218,410 r/	206,700 r/	212,600	210,000
INDUSTRIAL MINERALS						
Cement, hydraulic		3,546,000	3,300,000	3,400,000 e/	3,400,000	3,400,000
Magnesium compounds: e/						
Chloride		126,000 4/	125,000	125,000	140,000	125,000
Oxide		90,000	90,000	90,000	100,000	100,000
Nitrogen, N content of ammonia		3,030,000	2,590,000	2,470,000 r/	2,500,000 e/	2,500,000
Salt, all types		3,420,000	3,630,000	3,500,000 e/	3,500,000 e/	3,500,000
Sand, industrial e/		25,000,000	20,000,000	20,000,000	25,005,900	23,159,900
Sodium compounds, n.e.s.: e/						
Carbonate, synthetic		400,000	400,000	400,000	400,000	400,000
Sulfate:						
Natural		22,000	22,000	20,000	20,000	20,000
Synthetic		15,000	15,000	15,000	15,000	15,000
Sulfur: e/						
Elemental byproduct:						
Of metallurgy		125,000	125,000	125,000	125,000	125,000
Of petroleum and natural gas		290,000	290,000	290,000	300,000	300,000
Total		415,000	415,000	415,000	425,000	425,000
Sulfuric acid, 100% H_2SO_4		1,150,000	1,150,000	1,150,000	1,250,000	1,250,000
MINERAL FUELS AND RELATED MATERIALS						
Carbon black e/		111,000 4/	110,000	100,000	110,000	100,000
Coke, metallurgical		2,930,000	2,920,000	2,900,000	2,750,000 e/	2,800,000
Gas:						
Manufactured e/	million cubic meters	-- 4/	9,500	9,500	10,000	10,000
Natural:						
Gross	do.	82,600	82,000	83,100 r/	78,400	80,000
Marketed	do.	81,700	81,800	83,000 e/	77,400 e/	80,000
Natural gas liquids	thousand 42-gallon barrels	165,000	165,000	170,000	170,000	170,000
Peat, agricultural e/		300,000	300,000	300,000	300,000	300,000
Petroleum:						
Crude	thousand 42-gallon barrels	--	19,400	18,200 r/	23,500	20,000
Refinery products:						
Liquefied petroleum gas	do.	--	31,300	--	36,100	36,000
Mineral jelly and wax e/	do.	401 4/	600	600	600	600
Gasoline, motor	do.	100,000	73,500	74,000 e/	75,000 e/	75,000
Naphtha and white spirit	do.	100,000	83,100	100,000	84,200	85,000
Jet fuel	do.	38,000	39,800	39,000	44,200	40,000

See footnotes at end of table.

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TABLE 1--Continued
NETHERLANDS: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity 2/		1991	1992	1993	1994	1995 e/
MINERAL FUELS AND RELATED MATERIALS--Continued						
Refinery products--Continued:						
Liquefied petroleum gas	thousand 42-gallon barrels	--	31,300	--	36,100	36,000
Kerosene	do.	--	1,780	--	1,520	1,600
Refinery gas e/	do.	20,800 4/	21,200	21,200	22,000	20,000
Lubricants	do.	4,000	3,490	3,500 e/	3,750 e/	3,800
Residual fuel oil	do.	--	98,000	99,100 r/	84,400	85,000
Bitumen	do.	--	4,380	4,400	4,400 e/	4,500
Unspecified e/	do.	25,000	25,000	25,000	25,000	25,000
Total e/	do.	49,800	185,150	153,200	177,170	175,900

e/ Estimated. r/ Revised.
1/ Table includes data available through Apr. 1, 1996.
2/ In addition to the commodities listed, the Netherlands produces construction materials such as sand and gravel, but output is not reported and no basis exists to make reliable estimates of output.
3/ Sales.
4/ Reported figure.

TABLE 2
NETHERLANDS: STRUCTURE OF THE MINERAL INDUSTRY FOR 1995

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies	Location of main facility	Annual capacity
Aluminum, primary		Hoogovens Aluminium BV	Smelter at Delfzijl	219
Do.		Pechiney Nederland BV	Smelter at Vlissingen	178
Cadmium	tons	Budelco BV (Australian Overseas Smelting Pty. Ltd, 50%; Kempensche Zinkmaatschappij Zincs de la Campine BV, 50%)	Plant at Budel-Dorplein	650
Cement		ENCI Nederland BV (Eerste Nederlandse Cement Industrie NV)	10 plants at Maastrict	2,700
Do.		Cementfabriek IJmuiden BV	3 plants at IJmuiden	1,600
Do.		Cementfabriek Rozenburg BV	2 plants at Rozenburg	920
Lead		Hollandse Metallurgische Industrie Billiton BV	Electrolytic plant at Arnhem	35
Do.		Billiton Witmetaal BV	Electrolytic plant at Naarden	6
Magnesia		Billiton Refractories BV	Plant at Veendam	100
Do.		MAF Magnesite BV	Plant at Vlaardingen	40
Natural gas	million cubic meters per day	Nederlandse Aardolie Maatschappij BV (NAM)	Groningen, Leeuwarden, Assen, and other onshore gasfields and several offshore wells in the North Sea	225
Petroleum, crude	barrels per day	AMOCO, CONOCO, and UNOCAL	766 wells (204 producing) including: North Sea fields: Haven, Helder, Helm, Hoorn, Kotter, Logger, and Rijn	83,500 (63,000)
Do.	do.	NAM	Onshore fields: Berkel, DeLier, Ijselmonde, Meerkapelle, Pernis West, Pinacke, Rotterdam, Schoonebeck, Werkendam, and Zoetemeer	(20,500)
Refineries		6 companies, of which the major ones are:		1,230,500
Do.	do.	Netherlands Refining Co.	Refinery at Rotterdam	(446,000)
Do.	do.	Shell Nederland Raffinaderij BV	Refinery at Pernis	(374,000)
Do.	do.	Esso Nederland BV	Refinery at Rotterdam	(175,000)
Do.	do.	Total Raffinaderij Nederland NV	Refinery at Vlissingen	(150,000)
Salt		Akzo Salt and Basic Chemicals BV	Mines at:	4,000
			Hengelo	(2,000)
			Delfzijl	(2,000)
Sodium:				
Carbonate, synthetic		do.	Plant at Delfzijl	380
Sulfate, synthetic		do.	do.	600
Steel		Hoogovens IJmuiden BV	Plant at IJmuiden	6,100
Zinc		Budelco BV (Pasminco Europe BV, 50%; Kempensche Zinkmaatschappij Zincs de la Campine, 50%)	Plant at Budel-Dorplein	215

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THE MINERAL INDUSTRY OF

NORWAY

By Harold R. Newman

Since the discovery of North Sea petroleum in the late 1960's, petroleum production became the most important mineral activity in Norway. It was, at 17%, the largest mineral contributor to the gross national product (GDP) in 1995 and represented about 45% of total exports. Readily available hydroelectric power and ice-free ports facilitated the growth of energy-intensive industries, namely production of aluminum, ferroalloys, magnesium, and silicon metal.

Based on the results of a country-wide referendum, the Government rejected membership in the European Union (EU). Despite this, the Government was reviewing its tax and mining laws with the intent of becoming more competitive and conforming to member countries' laws. The Government would refund up to 50% of the cost of exploration drilling, and additional grants would provide up to 35% of the capital cost of developing certain minerals and specific areas (mainly north of Trondheim). While liberalization of mining laws could attract new investors in exploration, stringent environmental laws might inhibit traditional extraction.

Laws for metallic ore mining were relatively simple. Mineral rights were obtained by filing claims and maintained by payment of small annual fees. In addition to a 28% corporate tax, there were also municipal and county taxes ranging from 7.5% to 13.5%. The Norwegian mining laws for industrial minerals were more complicated and often overlapping. While most of the minerals were regulated by special mining laws, aggregates and sand and gravel were subject to construction laws.

Production of metallic ores has fallen gradually for many years, as existing mines were being depleted and no major new mines were replacing those being exhausted. This decline of metallic mineral output has been partially offset by increased production of industrial minerals. *(See table 1.)*

The Norwegian economy remained dependent on foreign trade and more than one-half of the GNP was derived from it. About 75% of the minerals consumed were imported. Petroleum was the most significant mineral commodity export, followed by metals and industrial minerals, mainly dimension stone.

The Norwegian Government's involvement in the mineral industry remained substantial, especially in offshore hydrocarbon production. The Government, through state-owned Den norske stats oljeselskap A/S (Statoil), continued to control all hydrocarbon production and refining. The rest of the mineral industry was dominated by Elkem A/S and Norsk Hydro A/S. *(See table 2.)*

The Government of Norway and Norsk Hydro signed a 50 year agreement that allows the company to make use of the water, considered to be property of the state, in four of its hydro-power plants, in return for about $200 million. These four plants produce about 3 billion kilowatt hours of electricity a year. The agreement, if approved by the Norwegian Parliament, provides some predictability for long term power costs and facilitates Norsk Hydro's expansion plan that could increase the Årdal aluminum smelter's capacity by 50,000 t/yr to more than 240,000 t/yr.

The first phase of the expansion, expected to take a year with an estimated cost of $42 million, would involve installing 26 new reduction cells, a new gas cleaning system, and raised rectifier capacity in the existing potroom. The second phase, expected to take 2 to 3 years with an estimated cost of $146 million, would replace the older Søderberg technology with prebaked anode cell technology in a second potroom.

Elkem Aluminium ANS, a division of Elkem A/S, operated two primary aluminum smelters in Farsund and Mosjoen, with a combined capacity of about 250,000 t/yr. Elkem has reportedly initiated a major program to modernize its Farsund plant. The $36 million investment aimed to reduce air and water pollution and was scheduled to be completed by 1998.

In 1995, two copper-containing sulfide mines were in operation with a combined production, at Royrvik and Gjersvik, estimated to be about 0.7 million metric tons (Mt). The largest producer of iron ore in Norway was Sydvaranger A/S. The mine, located in northern Norway near the Finnish border, produced about 1.7 Mt iron pellets, most of which were exported to Germany and the United Kingdom. Because reserves reportedly amounted to about only 10 Mt, the mine was expected to close in 1996.

Titania A/S was reportedly one of two hardrock ilmenite producers in the world. The mine in Tellnes reportedly averaged about 2.5 Mt of crude ore from which about 800,000 t of concentrate was produced with a 44.4% titanium oxide content and small amounts of magnetite and pyrite concentrate. About 20% of the concentrate was used as raw material for titanium dioxide pigment production by

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the sulfate process at Kronos Titan A/S in Fredrikstad.

BHP was reportedly planning to invest about $30 million in the 350,000 t/yr capacity ilmenite smelter in Tyssedal, owned by Tinfos Titan & Iron KS. Concentrate was to shipped from BHP's Beenup Mine in Western Australia. Tinfos was expected to start producing chlorinatable slag based on Australian ilmenite after 1997. The pigment industry was changing from the sulfate process to the chlorine process owing to environmental aspects. Because of a high magnesium and chromium content, Norwegian ilmenite can only be used in the sulfate process.

Norzik A/S, jointly owned by Boliden AB of Sweden and RTZ Corp. of the United Kingdom, announced its smelter would reach its peak capacity of 140,000 t/yr in 1996. Lower production in 1995 was the result of a ten week maintenance shutdown at one production unit.

Norway has a long coastline with excellent ports, favorable geology for a great variety of crystalline rock types, and situated relatively close to the European market. By value, about 70% of the industrial minerals produced and about 85% of the natural stone produced were exported.

The annual production value for industrial minerals was reported to be about $305 million; for dimension stone and slate, it was about $130 million. Opening of the mineral industry to foreign investors was insuring a steady growth, about 5% to 6% per year, of industrial mineral output.

Some of the world's largest resources of high quality olivine are on the southwestern coast of Norway in the Sunnmøre-Nordfjord area. A/S Olivin, with plants at Åheim and Stranda, was the world's leading producer of olivine products. The 2-Mt capacity open pit mine was 4 km from the plant and the port. The olivine ore was transported in a tunnel by conveyor belt.

Production of dimension stone has been steadily increasing as the industry, composed of many small firms, has been expanding. The most sought after stone was larvikite, a syenite with a feldspar lamellar structure that gives it a special luster. Also, banded dolomite from the Fauske area was highly regarded.

Offshore hydrocarbon production will remain Norway's principal economic activity for the next several decades. It represented about 33% of the country's total export earnings and accounted for 13% of GNP in 1995. Norway produced an average of about 2.71 million barrels per day (Mbbl/d) of crude oil in 1995 and was ranked number seven in world production.

Thirty-four exploration wells, including 21 wildcats and 13 appraisal wells, were completed or temporarily abandoned on the Norwegian continental shelf in 1995. Of these, 28 were in the North Sea and 6 in the Norwegian Sea.

In 1995, the Government approved the development of the Norne, Njord, Yme, Yme Beta East, Gullfaks, and Tordis East oil fields and the Loke Triassic, My, and Valhal (new wellhead platform) gas fields. The NorFra gas transport system to France was also approved.

To counter an anticipated decline in production over the next decade, the government has been encouraging the discovery of new resources. Exploration has been focused on finding resources near existing infrastructure. Greater emphasis will be placed in coming years on areas that are currently unexplored.

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TABLE 1
NORWAY: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity		1991	1992	1993	1994	1995 e/
METALS						
Aluminum:						
Primary		832,558 r/	812,850	887,461 r/	858,190	846,735 2/
Secondary		63,066 r/	57,043 r/	51,987 r/	47,994	65,000
Cadmium, smelter		227	247	213 r/	288	250
Cobalt		1,983 r/	2,293 r/	2,414 r/	2,823	2,804
Copper:						
Mine output:						
Concentrate		84,592 r/	49,645 r/	36,002 r/	31,116	30,000
Cu content		17,393 r/	12,668 r/	8,696 r/	7,412	6,800
Metal, primary and secondary:						
Smelter		38,444 r/	39,259 r/	37,205 r/	39,516	36,000
Refined		38,400	39,300	37,200	39,400	34,000
Gold e/	kilograms	1,000	1,200	800	200	--
Iron and steel:						
Iron ore and concentrate:						
Gross weight	thousand tons	2,209 r/	2,152 r/	2,162 r/	2,364	2,200
Fe content	do.	1,593	1,527	1,532	1,650	1,600
Metal:						
Pig iron	do.	61	70	73	70	70
Ferroalloys:						
Ferrochromium	do.	83	102	80	120	100
Ferromanganese	do.	173	203	226	249	250
Ferrosilicomanganese	do.	227	213	219	197	200
Ferrosilicon (75% basis)	do.	377	367	400	456	470
Silicon metal e/	do.	65	60	60	60	50
Other e/	do.	14	14	14	14	15
Total	do.	939	959	999	1,096	1,085
Steel, crude	do.	438	446	505 r/	454	470
Semimanufactures, rolled e/	do.	300	300	290	300	300
Lead, mine output:						
Concentrate		6,739 r/	7,083 r/	3,224 r/	5,953	3,000
Pb content		3,517 r/	3,767 r/	1,698 r/	3,096	1,000
Magnesium, primary		44,322 r/	30,404 r/	27,300	27,635	28,000
Nickel:						
Mine output:						
Concentrate		21,156 r/	31,306 r/	31,719 r/	26,470	26,000
Ni content		1,958	3,398 r/	3,462 r/	2,938	3,000
Metal, primary		58,730 r/	55,686 r/	56,817 r/	67,955	53,237
Platinum group metals e/ 3/	kilograms	1,500	1,500	1,500	1,500	1,500
Titanium:						
Ilmenite concentrate	thousand tons	625	708	713	826	800
TiO2 content	do.	277	318	315	320	325
Zinc:						
Mine output:						
Concentrate		37,690	41,055 r/	27,469 r/	30,117	30,000
Zn content		18,886 r/	21,658 r/	14,327	15,869	16,000
Metal, primary		124,916 r/	125,564 r/	129,192 r/	131,921	130,000
INDUSTRIAL MINERALS						
Cement, hydraulic	thousand tons	1,147 r/	1,266	1,344 r/	1,444	1,450
Feldspar e/		90,000	100,000	75,000 r/	62,905 2/	60,000
Graphite e/		6,930	7,000	6,500	5,566 2/	5,000
Lime, hydrated, and quicklime e/	thousand tons	100	100	100	100	100
Mica, flake e/		3,000	3,000	3,000	3,000	3,000
Nepheline syenite e/	thousand tons	292	334	350	279 2/	300
Nitrogen, N content of ammonia	do.	384	343	315	271	275
Olivine sand	do.	2,505	2,789 r/	2,955 r/	3,109	3,000
Pyrite	do.	306	247	92	1	--
Stone, crushed:						
Dolomite	do.	600	650	650	743	750
Limestone	do.	4,000	3,500	3,500	4,357	4,000
Quartz and quartzite	do.	800	900	900	891	900

See footnotes at end of table.

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TABLE 1--Continued
NORWAY: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity		1991	1992	1993	1994	1995 e/
INDUSTRIAL MINERALS--Continued						
Sulfur:						
Pyrite, S content e/	thousand tons	121	125	125	125	125
Byproduct of: e/						
Metallurgy	do.	75	75	75	75	75
Petroleum	do.	15	15	15	15	15
Total sulfur	do.	211	215	215	215	215
Talc, soapstone, steatite e/	do.	80	60	50	28	30
MINERAL FUELS AND RELATED MATERIALS						
Coal, all grades	thousand tons	389	449	309 r/	301	300
Gas, natural:						
Gross	million cubic meters	28,300	27,700	28,100 r/	30,833	47,000
Marketed 4/	do.	25,000 e/	27,700	28,500	26,800	28,000
Peat: e/						
For agricultural use	do.	30	30	30	30	30
For fuel use	do.	1	1	1	10	10
Petroleum:						
Crude 5/	thousand 42-gallon barrels	679,184 r/	793,553 r/	855,643 r/	913,632	980,000
Natural gas liquids	do.	17,204	17,200	25,342 r/	24,500	27,300
Refinery products:						
Naphtha e/	do.	4,200	4,200 2/	4,000	1,000	1,000
Gasoline	do.	23,228 r/	28,087	28,680 r/	27,149	28,000
Kerosene	do.	6,549 r/	8,134 r/	8,499 r/	9,068	10,000
Distillate fuel oil	do.	44,796 r/	47,274 r/	48,515 r/	55,000	55,000
Residual fuel oil	do.	9,960	11,200	10,700 r/	11,255	12,000
Other e/	do.	4,000	4,000	4,000	4,000	4,000
Refinery fuel and losses e/	do.	4,000	4,000	4,000	4,000	4,000
Total e/	do.	96,733 r/	106,895 r/	108,394 r/	111,472 r/	114,000

e/ Estimated. r/ Revised.
1/ Table includes data available through May 1996.
2/ Reported figure.
3/ Data represent exports.
4/ Reported as total methane sales.
5/ Excluding natural gas liquids.

TABLE 2
NORWAY: STRUCTURE OF THE MINERAL INDUSTRY FOR 1995

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity
Aluminum	Hydro Aluminium A/S (Norsk Hydro A/S 70%)	Smelters at Ardal, Hoyanger, Karmoy, and Sunndalsora	600
Do.	Elkem Aluminium (Elkem A/S 50% and Alcoa 50%)	Smelters at Farsund and Mosjoen	250
Do.	Sor-Norge Aluminium A/S (Alusuisse 50% and Hydro Aluminium 49%)	Smelter at Odda	50
Cadmium	Norzink AS (Boliden AB 50% and Rio Tinto Minerals Development Ltd.)	Smelter at Eitrheimsneset	0.3
Cement	Norcem A/S	Plants at Brevik and Kjopsvik	2,150
Coal	Store Norske Spitsbergen Kulkompani A/S	Mines at Longyearbyen and Svea	450
Cobalt	Nikkelverk A/S (Falconbridge Nickel Mines Ltd. 100%)	Smelter at Kristiansand	3
Copper:			
Ore, Cu content	Grong Guber A/S (Norsulfid A/S 100%)	Mines at Royrvik and Gjersvik	8
Do.	Nikkel og Olivin AS (Norsulfid A/S 100%)	Mine at Narvik	1
Metal	Nikkelverk A/S (Falconbridge Nickel Ltd 100%)	Smelter at Kristiansand	40
Dolomite	Franzefoss Bruk A/S	Mine at Ballagen	350
Do.	Norwegian Holding A/S	Mines at Hammerfall, Logavlen, and Kvitblikk	500
Feldspar	Franzefoss Bruk A/S	Mine at Lillesand	100

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TABLE 2–Continued
NORWAY: STRUCTURE OF THE MINERAL INDUSTRY FOR 1995

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity
Ferroalloys	Elkem Rana (Elkem A/S 100%)	Ferrochromium plant at Mo i Rana	140
Do.	Elkem Sauda (Elkem A/S 51% and BHP 49%)	Ferromanganese plant at Sauda	250
Do.	Elkem PEA (Elkem A/S 51% and BHP 49%)	Ferromanganese plant at Porsgrunn	200
Do.	Elkem Salten (Elkem A/S 100%)	Ferrosilicon plant at Straumen	85
Do.	Elkem Bjolvefossen (Elkem A/S 100%)	Ferrosilicon plant at Alvik	60
Do.	Elkem Thamshavn (Elkem A/S 100%)	Ferrosilicon plant at Orkanger	60
Do.	Finnfjord Smelterverk, Rana Metal (Fesil 100%)	Ferrosilicon plant at Mo i Rana	140
Do.	A/S Hafslung Metal (Fesil 100%)	Ferrosilicon plant at Sarpsborg	75
Do.	Ila og Lilleby Smelterverk (Fesil 100%)	Ferrosilicon plant at Finnsnes	60
Do.	Oye Smelterverk (Tinfos Jernverk A/S 100%)	Silicomanganese plant at Kvinesdal	235
Iron, metal	Ulstein Jernstoperi A/S	Hordvikneset	10
Iron ore	Rana Gruber A/S (Norsk Jernverk Holding A/S 100%)	Mine at Mo i Rana	2,000
Do.	A/S Sydvaranger (Government 87.45%)	Bjornevatn Mine at Kirkenes	1,500
Lead ore, Pb content	A/S Bleikvassli Gruber (A/S Sydvaranger 100%)	Mine at Bleikvassli	2
Lime	Hylla Kalkverk (Nikolai Bruch A/S 100%)	Verdal/Trondheim Mine and plant	80
Do.	A/S Norsk Jernverk	Plant at Mo i Rana	48
Do.	Ardal og Sunndal Verk A/S	More og Romsdal Mine at Surnadal	20
Do.	Breivik Kalkverk A/S	Alesund Mine at Larsnes	20
Do.	Mjoendalen Kalkfabrik	Plant at Asen/Drammen	7
Limestone	Norcem A/S	Dalen, Bjorntvedt, and Kjopsvik Mines	1,600
Do.	Vardelskalk A/S (Franzefoss Burk A/S 100%)	Sandvika Mine	800
Do.	Breivik Klakverk A/S	Visnes and Glaerum Mines	500
Magnesium	Norsk Hydro A/S (Government 51%)	Plant at Porsgrunn	35
Natural gas million cubic meters	Den Norske Stats Oljeselskap A/S	Gama, Gullfaks, Sleipner Ost, and Statfjord Fields	12,270
Do.	Phillips Petroleum Company Norway	Ekofisk Field	9,900
Do.	Elf Petroleum Norge A/S	Frigg, Heimdal, and Ost-Frigg Fields	5,750
Do.	Norsk Hydro Produksjon A/S	Troll-Oseberg Field	2,600
Do.	BP Petroleum Development of Norway	Gyda and Ula Fields	1,040
Do.	Esso Norge as	Odin Field	1,000
Do.	Amoco Norway A/S	Hod and Valhall Fields	910
Nepheline syenite	North Cape Mineral A/S (Unimin Corp. 84%)	Mine at Stjernoy	350
Nickel:			
Ore, Ni content	Nikkel og Olivin A/S (Norsulfid A/S 100%)	Mine at Narvik	3
Do.	Titania A/S (Kronos Norge A/S 100%)	Mine at Tellnes	0.5
Metal	Nikkelverk A/S (Falconbridge Nickel Mines Ltd. 100%)	Smelter at Kristiansand	60
Olivine	A/S Olivin	Aheim Mine at Sunnmore	2,500
Do.	Franzefoss Bruk A/S	Lefdal Mine at Bryggja	500
Do.	Idustrimineraler A/S	Stranda Mine at Nordfjord	300
Petroleum barrels per day	Den Norske Stats Oljeselskap A/S	Gullfaks, Statfjord, Tommeliten, and Veslefrikk Fields	1,069,300
Do.	Norsk Hydro Produksjon A/S	Brage, Mime, and Oseberg Fields	566,200
Do.	Phillips Petroleum Company Norway	Ekofisk Field	237,500
Do.	Saga Petroleum A/S	Snorre Field	170,000
Do.	BP Petroleum Development of Norway	Gyda and Ula Fields	155,000
Do.	A/S Norske Shell	Draugen Field	90,000
Pyrite	Folldal Verk A/S (Norsulfid A/S 100%)	Mine at Hjerkinn	10
Quartzite	Elkem Tana (Elkem A/S 100%)	Mine at Tana	540
Do.	Elkem Marnes (Elkem A/S 100%)	Mine at Sandhornoy	200
Do.	Vatnet Kvarts A/S	Mine at Nordland	150
Do.	Snekkevik Kvartsbrudd	Mine at Kragero	110
Steel	Fundia AB (Norsk Jenverk 50% and Rataruukki 50%)	Plants at Christiania, Spigerverk, Mandal Stal, and Moi Rana	600
Talc	A/S Norwegian Talc (Pluess-Staufer AG 51%)	Mine/plant at Altermark/Knarrevik and Framfjord	90
Do.	Kvam Minerals A/S	Mine/plant at Kvam	6
Titanium, concentrate	Titania A/S (Kronos Norge A/S 100%)	Mine at Tellnes	800
Zinc:			
Ore, Zn content	Grong Guber A/S (Norsulfid A/S 100%)	Mines at Royrvik and Gjersvik	10
Do.	A/S Bleikvassli Gruber (A/S Sydvaranger 100%)	Mine at Bleikvassli	10
Metal	Norzik A/S (Boliden Mineral AB 50%)	Smelter at Eitrheimsneset	137

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THE MINERAL INDUSTRY OF

POLAND

By Walter G. Steblez

Poland remained a major world producer of coal, copper, salt, silver, and sulfur and was ranked among the top European producers of lead, lime, nitrogen (in ammonia),and zinc.

In 1995, Poland's growing market economy displayed continuing growth and improvement in contrast to the country's centrally planned economy's contraction during the 1990-92 period. In 1995, Poland's GDP reportedly increased by about 7%, compared with that of 1994, and industrial production rose by 9.4%.[1] The chief issues that affected Poland's minerals industry in 1995 included the continued denationalization and decentralization of industrial enterprises, including those in the country's minerals sector.

The Government of Poland continued to promote the decentralization and privatization of the economy, as well as the growth of both the domestic and export markets. The private sector's share in industry also continued to grow but was modulated by social demands for slower denationalization of large-scale, state-owned heavy industry enterprises, such as those in mining, metals production, and machine building. According to official sources, a total of 417 industrial enterprises were denationalized in 1994, of which 10 were in the mining and quarrying sector, 33 were in the industrial minerals products sector and 7 were involved in the production of metals.[2] Reportedly, preliminary data for 1995 showed the process of privatization to have started in 479 enterprises.[3] To conform with the emerging market economy in Poland, in February 1994, the Sejm, Poland's lower legislative body, adopted new laws on geologic surveying and mining. One of the main provisions of the new legislation addressed the tension arising from the country's need to mine and its need to protect the environment. Provisions in the new law also regulated concessions and worker safety in underground mining and defined responsibility for damages stemming from mine subsidence.[4]

Environmental protection also remained an important component of the Government's plans to restructure the country's economy.

Pollution from heavy industrial point sources (mining, processing, smelting, and electric power generation) continued to pose major problems with respect to actual and potential damage to public health and the general environment and, consequently, in some areas constrained the development of the country's minerals sectors. A significant portion of atmospheric pollutants, such as sulfur dioxide annually generated in Poland, was associated with the consumption of low-rank coal and lignite at thermal electric power stations. Of the total 31,390 MW of electric power generating capacity, 23,090 MW was produced by coal-fired thermal electric powerplants, of which approximately 65% was generated at plants using lignite.[5] In 1994, the emission of carbon dioxide, sulfur dioxide and nitrous oxide remained at about the same levels that were emitted in 1993, amounting to 534,000 t, 1,726,000 t,and 552,000 t, respectively.[6]

In 1995, Poland's output of metals generally remained at levels that were achieved in 1994. The production of most industrial minerals and mineral fuels also remained at levels comparable to those achieved in 1994. (*See table 1.*) The information provided in table 2 lists the names of administrative bodies as well as subordinate production units of the main branches of the country's mineral industry in 1995. (*See table 2.*)

Available aggregated commodity trade returns for 1994 indicated the value of Poland's metals exports to have increased sharply by 44% compared with those of 1993 and to have constituted about 14% of the country's total industrial exports.[7] About 68% of Poland's exports of metals was received by developed market economy countries; about 24% was received by developing countries, and 8% by transitional economy countries of Eastern and Central Europe and the Republics of the FSU. Poland's major metals exports in 1994 were aluminum, copper, silver, steel, and zinc (amounting to 55,094, 353,784, 979, 3,875,100, and 91,064 tons, respectively).[8] In 1994, the value of imports of metals represented about 5.1% of the value of the country's total imports, increasing by approximately 54% compared with those of 1993. In terms of value, about 58% of Poland's imports of metals was obtained from developed market economy countries, 37% was received from the transitional economy countries of Eastern Europe and the Republics of the FSU, and about 5% from developing countries. Poland's imports of iron ore and concentrate in 1994 amounted to 8,447,700 t. The Republics of the FSU, especially the Ukraine and Russia, remained Poland's chief suppliers of iron ore, providing, in terms of value, 86% of the country's total imports. Poland's other major metal imports included rolled steel and semimanufactures, about 740,000 t, and aluminum, 77,194 t. Germany was a major supplier of steel products

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to Poland, accounting for about 14% of the total value of Poland's steel imports during the year.

Exports of industrial minerals continued to increase in 1994. Compared with those of 1993, Poland's exports of commodities produced by this sector increased by about 58%, constituting about 3.5% of Poland's total exports for 1994. Cement, glass, and sulfur were among the country's principal industrial mineral exports, amounting to 4,401,300 tons, 1,813,500 tons, and 275,900 tons, respectively. Major importing countries of Poland's sulfur and unroasted pyrites in 1994 were Brazil, the Czech Republic, and the United Kingdom (15%, 7%, and 6%, respectively, of the value of total exports of sulfur in 1994).[9] Germany was the major importer of cement, lime, and fabricated construction materials produced in Poland, which accounted for 93% of the total exports of these commodities from Poland. The value of Poland's imports of industrial minerals increased by 63% in 1994 compared with those of 1993, and constituted 2.4% of total imports for 1994.

In respect to mineral fuels, Poland continued to be both a major exporter of bituminous coal and importer of petroleum and natural gas. Poland's total coal exports for 1994 amounted to 27,977,000 t; coke and semicoke exports were reported at 3,105,000 tons. Finland, Germany, and the United Kingdom were among the principal recipients of Polish coal during the year, respectively accounting for 14%, 12%, and 19% of the total value of the exported coal. On the other hand, Poland continued to depend on shipments of crude petroleum from the Republics of the former FSU. Poland's total imports of petroleum in 1994 amounted to more than 12.7 Mt, of which slightly more than 50% was supplied by former Soviet producers. Russia's share of petroleum exported to Poland in 1994 amounted to 47%.[10] Russia also provided Poland with about 99% of the country's import requirement of natural gas during the year. The country's total imports of natural gas amounted to about 2.3 billion cubic meters.

Although Poland maintained critical commercial linkages with former fellow members in the CMEA, especially in respect to mineral raw materials, the country's foreign trade in recent years on balance has demonstrated major diversification in the market for all commodity groups.

In 1995, Preussag AG of Hannover Germany, established a trading office in Warsaw to help expand its commercial operations in Poland, which reportedly in 1994 generated US$130 million in revenues. Preussag's main operations in Poland involve trading in steel and nonferrous metals. Reportedly, Preussag's trading office in Warsaw would serve not only as a base for expanding the company's operations in Poland but also those in other former CMEA areas.[11]

The chief activities in Poland's aluminum industry involved efforts to denationalize Poland's aluminum smelter at Konin and to increase the country's aluminum fabricating base. In early 1995, officials of Huta Aluminium Konin SA (HAK) announced plans to seek foreign investment to modernize the company's production lines, largely through foreign investment. HAK officials indicated that the cost of the modernization program would extend over 5 years and would amount to about US$60 million. The HAK smelter produced about 50,000 t/yr of primary aluminum from alumina imported from Ireland and Spain on the basis of a 4-year contract, which represented about 50% of the Poland's annual consumption of primary aluminum.[12] About 20% of the company's output was designated for export, largely to Germany. The denationalization and sell-off of the Hak smelter was scheduled for yearend 1995. By yearend, a short list narrowed perpective bidders for HAK to two: Alumax Inc. of the United States and a domestic firm. Alumax reportedly was negotiating to acquire a 75% interest in the company.[13]

Continental Can Europe's subsidiary, Continental Can Polska SA, announced in December 1994 that aluminum would be the company's metal of choice at the company's new US$50 million production line at Radomkoski. At full capacity, this fabricating facility would produce 450 million cans per year. Additionally, Can Corp.(Pennsylvania) of the United States was the main investor in facility expansion at the Brzesko packaging plant near Krakow. A new production line was reportedly installed at this facility that at full capacity would produce 300 million aluminum cans per year.[14]

The issue of privatizing Kombinat Gorniczo Hutniczy Miedzi (KGHM), Poland's mining, beneficiation, smelting and refining complex, remained current in 1995. Discussions and plans concerning the privatization, or at least denationalization had not acquired any concrete form during this period. By yearend 1994, KGHM's status was that of a stock company with the State holding 100% of the company's shares.[15] By yearend 1995, despite the Government's sell-off approval, KGHM's status remained unchanged. However, the Ministry for Privatization reportedly opened a tender that sought an adviser for a future sale of a 24% stake in KGHM. In an effort to acquire an international dimension, KGHM also indicated that it had been considering the acquisition of mining and investment rights at copper deposits in Chile, Zaire, and Zambia.[16]

In the country's steel industry two major trends were discernible in 1995: plans for the industry's restructuring that were generally consonant with proposals developed in 1992 by a consortium of consultants from Canada and plans to raise continuous casting from about 12% of total steel production in 1995 to about 30% in 1996. The restructuring plan reportedly was to involve cooperation between Huta Sendzimira and Huta Katowice in the form of resource pooling. Huta Katowice would use spare steel production capacity of about 1.5 to 1.7 Mt/yr to supply

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Huta Sendzimira's 3.2 Mt/yr-rolling mills with slabs. Also, Huta Sendzimira would be in an environmentally better position in respect to nearby Krakow because of the reduction in the local smelting operations.[17] Plans to streamline the steel industry in general continued. Steel production by open hearth method declined from 29% of total steel production in 1990 to about 14% in 1994. Continuous casters were installed during the year at Zawiercia, Huta Katowice, and several other facilities. Voest-Alpine Industrieanlagenbau GmbH of Austria, Mannesmann-Demag AG of Germany, and Danieli & C. SpA of Italy were the principal suppliers of equipment for these projects. Significantly, Huta Zawiercia with an electric steel-making capacity of 1 Mt/yr became the first major Polish steel producer to achieve 100% continuous casting.[18]

Lead and zinc ore was mined in the southeastern part of the country at three underground mines. The Boleslaw mining, concentrating, and zinc refining complex at Bukowino produced ore reportedly grading 0.6% lead and 3.4% zinc. The Olkuz-Pomorzany Mine, near Olkusz, part of the Boleslaw operation, produced ore reportedly grading 1.2% lead and 3.5% zinc, and the Trzebinia Mine and concentrator, at Trzebinia, near Chrzanow, produced ore grading 3.7% lead and 2% zinc.

In 1995, the privatization and foreign ownership of Poland's cement industry continued. Reportedly, Lafarge of France acquired the Kujawy cement plant in July for US$46 million. The Kujawy cement plant was the seventh Polish cement mill to have been privatized by the country's Ministry of Privatization. Lafarge also announced plans to make investments at the Kujawy facility equivalent to about US$37 million during the subsequent 5-year period.[19] Also, CRH Plc. of Dublin, Ireland, announced the acquisition of 75% of the shares in Poland's Cementownia Ozarow SA (Ozarow). Orazow, about 170 km southeast of Warsaw, was reported to own substantial reserves of limestone nearby. The facility operated two kilns with a total output of 2.3 Mmt/a.[20]

In September, Poland's Ministry for Privatization announced a tender for potential investors interested in acquiring 10% of the Inowroclawskie Kopalni Soli SA, one of the country's major salt mines.[21]

Moreover, Poland's Ministry for Privatization late in the year decided to offer the country's state-owned soda ash operations, Janikosoda SA and Soda Matwy SA, for sale. Then combined capacity of both plants was reported to be about 500,000 t/yr of soda ash as well as a number of other products. The initial offering amounted to 75% of the shares of both companies. Rhone Poulenc of France and Solvay SA of Belgium reported interest in the stock offering as well as in the Inowroclawskie Kopalni salt mining operation.[22]

In terms of output, consumption, and export trade, coal remained the country's chief mined product. Poland's resources of bituminous and anthracite coal were in Upper and Lower Silesia and in the Lublin District. The governing factors bearing on the future of Poland's coal industry were depletion (or near depletion) at a significant number of the country's bituminous coal mines and the availability of investment capital to develop mines and deposits with the best likelihood of operating profitably. Within the context of the country's transition to a market economy system, the restructuring of Poland's coal mining sector involved the division of the bituminous coal mining and processing sector into 8 companies, each consisting of between 7 and 13 mines. Reportedly, the criteria that were used to determine the distribution of mines by company included the mines' proximity to each other, the feasibility of using common equipment and materials, the maximum exploitation of deposits, and the greatest capability of reemploying workers from closed mines. The actual restructuring program began with the decision to close seven mines determined to be beyond any chance of becoming profitable. However, the social costs associated with rapid closures, coupled with organized protests and strikes by trade unions, had put considerable restraints on this process. These restraints, given other imperatives of the economy (continued high reliance on coal until after the year 2000 and the need to capitalize current profitable mines and new deposits), would be short term, in view of the average US$70/mt of produced coal subsidies issued by the Government to money losing coal-mining enterprises.

Because of the country's need for greater amounts of domestically produced energy as well as the constraints on the choice of energy carriers, dictated by environmental protection concerns, Poland's energy-producing sector devoted a great deal of attention and work during 1994 toward developing the country's commercial coalbed methane deposits. To achieve this end, Poland's Ministry of Environmental Protection and Natural Resources and Forestry auctioned prospecting concessions at about 12 coal deposits in the Silesian coal basin. Apparently, the richest coalbed methane deposit to date has been found in the Rybnik Coalfield.[23] Currently, less than 30% of the gas is recovered at the mines; about 3,000 Mm^3 is lost annually. Resources of coalbed methane are believed to approximate those of conventional natural gas, which are the basis for producing about 4,000 Mm^3/yr of gas. Given the approximate 7,000 Mm^3/yr of gas imported from Russia, the development of the country's coalbed methane resources could effectively reduce natural gas imports by more than 55% in the near term. In 1995, Poland had 4,500 km of pipeline for natural gas, 1,986 km of pipeline for crude petroleum, and 360 km of pipeline for refined products.

To ensure maximum interim employment during the country's economic transition to a market economy, near-term Government policies probably will continue to direct subsidies to some state-owned heavy industries, such as

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coal mining and steel production. The steel industry's production profile in the long term should tend toward the output of higher value specialty steels. Poland's coal, copper, lead, sulfur, and zinc industries, because of their developed infrastructures and operations and relatively well-assured mineral resources, should continue mining and processing activities (with improved pollution controls) for at least another 10 to 15 years.

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[1] FBIS-EEU-96-026-S, Feb. 7, 1996, p. 16; from PAP 1526 GMT Jan. 31, 1996.
[2] Rocznyik Statystyczny Przemyslu, 1995, p. 19.
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[6] Rocznik Statystyczny, 1995, p. 31.
[7] Rocznik Statystyczny Prezemyslu, 1995, p. 168.
[8] Yearbook of Foreign Trade Statistics, 1995, pp. 140-143.
[9] Work cited in footnote 8, p. 262.
[10] Work cited in footnote 8, p. 266.
[11] American Metal Market, v. 102, No. 239, p. 4.
[12] Mining Magazine, Feb. 10, 1995, p. 113; and Rocznik Statystyczny Przemyslu, 1995, p.175.
[13] Mining Journal (London), Nov. 6, 1995, p. 255.
[14] American Metal Market, v. 102, No. 247, Dec. 23, 1994, p. 10.
[15] Metal Bulletin (London), Feb. 17, 1994, p. 16.
[16] Mining Journal (London), Dec. 22-29, 1995, p. 474.
[17] Metal Bulletin Monthly, Feb. 1995, p. 71.
[18] American Metal Market June 6, 1995, pp. 1, 16.
[19] FBIS-EEU-95-168-S Aug. 30, 1995 p. 15; from Rzeczpspolita July 14, 1995, p. 1.
[20] Industrial Minerals July 1995, p. 57.
[21] Mining Journal (London) Sept. 1, 1995, p. 154.
[22] Industrial Minerals, Oct. 1995, p. 19, and Nov. 1995, p. 24.
[23] Mining Magazine (London). Dec. 1992, pp. 387, 389.

TABLE 1
POLAND: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity 2/		1991	1992	1993	1994	1995 e/
METALS						
Aluminum metal, primary		45,973 r/	43,628 r/	46,942 r/	49,509 r/	52,000 3/
Alumina, nonmetallurgical (<30% Al2O3) e/		200	200	200	200	200
Cadmium metal, primary		364	132	149	150	150
Copper:						
Ore:						
Gross weight	thousand tons	24,734 r/	24,114 r/	27,113 r/	26,136 r/	26,500
Metal content		358,000 r/	373,000	431,000 r/	395,000 r/ e/	397,000
Concentrate:						
Gross weight	thousand tons	1,450 r/ e/	1,453 r/	1,559 r/	1,570 e/	1,550
Metal content		320,100 r/	331,900 r/	383,600 r/	380,000 e/	380,000
Metal:						
Smelter:						
Primary		358,000 e/	385,486 r/	396,000 e/	350,000	350,000
Secondary		15,000 e/	15,963 r/	16,000 r/ e/	15,000	15,000
Total		373,000	401,449	412,000 r/	365,000	365,000
Refined (cathode)		378,479 r/	387,010 r/	404,170 r/	405,093 r/	407,000 3/
Gold: e/						
Mine output, Au content, recoverable	thousand kilograms	30	30	30	30	30
Metal, smelter 4/	kilograms	300 r/	300 r/	300 r/	300	300
Iron and steel:						
Iron ore and concentrate, gross weight		(5/)	--	--	--	-- 3/
Metal:						
Pig iron:						
For foundry use	thousand tons	298	294	206	204 r/	250
For steel production	do.	5,999 r/	6,021 r/	5,899 r/	6,662 r/	7,000
Other		218	183	193	216 r/	250
Total		6,515 r/	6,498 r/	6,298 r/	7,082 r/	7,500
Ferroalloys:						
Ferrochromium		1,930 r/	35,300 r/	38,400 r/	7,000	7,000
Ferromanganese:						
From blast furnaces		57,400	43,400	56,400 e/	55,000	50,000
From electric furnaces		9,200	4,800	1,100 r/	1,000	1,000
Ferrosilicon		60,100	36,100	43,100 r/	40,000	40,000
Other electric furnace ferroalloys		34,700	30,800	30,000	30,000	30,000
Total electric furnace		105,000	107,000	113,000 r/	78,000	78,000
Spiegeleisen		--	100	-- r/	--	--

See footnotes at end of table.

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TABLE 1--Continued
POLAND: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity 2/		1991	1992	1993	1994	1995 e/
METALS--Continued						
Steel, crude:						
From open hearth furnaces	thousand tons	2,640	1,820	1,660	1,631 r/	2,000
From oxygen converters	do.	5,750	6,250	6,160	7,033 r/	7,090
From electric furnaces	do.	2,050	1,800	2,120	2,447 r/	2,800
Other	do.	6	2	--	2 r/	--
Total	do.	10,446	9,872	9,940	11,113	11,890 3/
Semimanufactures:						
Rolled excluding pipe	do.	8,040	7,550	7,630 r/	8,595 r/	8,959 3/
Pipe	do.	519	520	488 r/	503 r/	572 3/
Lead:						
Pb-Zn ore, gross weight	do.	4,849 r/	5,017 r/	4,817 r/	4,871 r/	4,900
Mine output, Pb content		63,600	70,100	68,400 r/	68,000	68,000
Concentrate, gross weight		67,000 e/	68,600	67,400 r/	67,000	67,000
Pb content		47,000	51,000 r/	49,100 r/	48,000 r/ e/	48,000
Metal:						
Smelter:						
Primary		20,800	22,300	30,400 r/	30,000 r/	30,000
Secondary		33,000 r/	36,200	35,500 r/	35,000 r/	35,000
Total		53,800 r/	58,500	65,900 r/	65,000	65,000
Refined		50,800	56,700	62,300	61,300	62,000
Silver, mine output, Ag content, recoverable		899	798	767	1,064 r/	1,000
Zinc:						
Mine output, Zn content		175,600 r/	186,200 r/	182,600 r/	185,000	185,000
Concentrate output, Zn content		144,700 r/	151,700 r/	150,900 r/	150,000	150,000
Metal, refined, including secondary		126,000	134,600 r/	149,100 r/	158,000	155,000
INDUSTRIAL MINERALS						
Barite		18,300	15,700	-- r/	25,000	20,000
Cement, hydraulic	thousand tons	12,012 r/	11,908 r/	12,200	13,834 r/	13,884 3/
Clays and clay products, crude:						
Bentonite	do.	35	18	9	21	20
Fire clay	do.	443	362	316	316	300
Kaolin:						
Crude	do.	233	229	265	230	250
Beneficiated	do.	44	42	48	48	50
Diatomite		--	1,500	1,300	1,300	1,500
Feldspar:						
Run of mine		24,000 r/	34,000 r/	43,000 r/	30,000	30,000
Beneficiated		23,800	22,600	30,700	25,000	25,000
Gypsum and anhydrite, crude 6/	thousand tons	819	848	832	1,055 r/	950
Lime, hydrated and quicklime	do.	2,413 r/	2,526 r/	2,584 r/	2,516 r/	2,500
Magnesite:						
Ore, crude	do.	14,000	17,000	34,000 r/	34,000	34,000
Concentrate	do.	8,100	12,900	13,000	16,400	16,000
Calcined		1,900	1,800	1,400 r/	1,500	1,500
Nitrogen, N content of ammonia	thousand tons	1,531 r/	1,490	1,419 r/	1,500 r/	1,500
Salt:						
Rock	do.	556	582	718 r/	750 r/	700
Other	do.	3,284 r/	3,305 r/	3,099 r/	3,324 r/	3,300
Total	do.	3,840 r/	3,887 r/	3,817 r/	4,074 r/	4,000
Sand, excluding glass sand	do.	3,458 r/	2,503 r/	2,892 r/	1,800	2,000
Silica:						
Quartz, crystal		28,800	30,600	55,600 r/	30,000	30,000
Rock crystal		55	--	1	10	10
Quartzite, refractory		167,000	104,000	129,000	110,000	110,000
Quartz schist		18,100	13,300	11,500	12,000	12,000
Glass sand	thousand tons	875	783	824	759	800
Glass:						
Construction, flat	do.	323	308	295	266 r/	300
Technical	do.	50	40	44	46 r/	45
Commercial	do.	58	53	48	54	55
Packing	do.	592	565	624	712 r/	700

See footnotes at end of table.

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TABLE 1--Continued
POLAND: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity 2/		1991	1992	1993	1994	1995 e/
INDUSTRIAL MINERALS--Continued						
Sodium compounds, n.e.s.:						
Carbonate (soda ash)	thousand tons	962	929	815	997 r/	1,000
Caustic soda (96% NaOH)	do.	324	326	296	297 r/	327 3/
Stone:						
Dolomite	do.	4,702 r/	4,809 r/	4,305 r/	4,500	4,500
Limestone	do.	12,006 r/	11,373 r/	11,075 r/	11,500 r/	11,000
Sulfur:						
Native:						
Frasch	do.	3,280	2,330	1,860	2,200	2,200
Other than Frasch	do.	601	562	--	--	--
Total	do.	3,881	2,892	1,860	2,200	2,200
Byproduct:						
From metallurgy	do.	185	207	220	200	200
From petroleum	do.	28	26	29	25	25
Total	do.	213	233	249	225	225
From gypsum e/	do.	10	10	10	10	10
Total sulfur e/	do.	4,104	3,135	2,119	2,435	2,435
MINERAL FUELS AND RELATED MATERIALS						
Coal:						
Bituminous	do.	140,376 r/	131,531 r/	130,479 r/	133,933 r/	136,161 3/
Lignite and brown	do.	69,406 r/	66,852 r/	68,129 r/	66,770 r/	63,547 3/
Total	do.	209,782 r/	198,383 r/	198,608 r/	200,703 r/	199,708
Coke:						
Coke oven	do.	11,316 r/	11,036 r/	10,275 r/	11,454 r/	11,570
Gashouse	do.	55	27	7	2 r/	9
Semicoke	do.	40	31	--	-- r	--
Total	do.	11,411 r/	11,094 r/	10,282 r/	11,456 r/	11,579 3/
Fuel briquets, all grades	do.	125	95	102	92 r/	95
Gas:						
Natural	million cubic meters	4,130	4,020	4,950	4,635 r/	4,820 3/
Manufactured:						
Town gas	do.	70 r/	60 r/	38 r/	15	15
Coke oven gas	do.	5,056 r/	4,881 r/	4,435 r/	4,911 r/	4,900
Blast furnace gas	do.	12,499	11,895	11,247	12,847	12,500
Generator gas	do.	924	670	554	399	400
Total	do.	18,549	17,506	16,274	18,172	17,815
Natural gas liquids, e/	thousand 42-gallon barrels	30	30	30	30	30
Peat, fuel and agricultural	thousand tons	167	134	110	100	100
Petroleum:						
Crude:						
As reported	thousand tons	158	199	235	284 r/	280
Converted	thousand 42-gallon barrels	1,170	1,480	1,740	1,700	2,070
Refinery products 7/	do.	85,700	93,000	99,000	98,000	100,000

e/ Estimated. r/ Revised.

1/ Table includes data available through June 1996.

2/ In addition to the commodities listed, antimony, cobalt, germanium, a variety of crude nonmetallic construction materials, and carbon black also are produced but available information is inadequate to make reliable estimates of output levels. Poland also may produce alumina in small quantities, but details of such an operation if it exists are not available.

3/ Reported figure.

4/ Based on official Polish estimates.

5/ Less than 1/2 unit.

6/ Includes building gypsum, as well as an estimate for gypsum used in production of cement.

7/ Includes virtually all major products; excludes some minor products as well as refinery fuel and losses.

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TABLE 2
POLAND: STRUCTURE OF THE MINERAL INDUSTRY FOR 1995

(Thousand of metric tons unless otherwise specified)

Commodity	Major operating companies	Location of main facilities	Annual capacity
Aluminum:			
Primary	Huta Aluminium	Konin	50.
Secondary	do.	do.	20.
Coal:			
Bituminous	Hard Coal Association in Liquidation State Coal Agency	71 mines at Upper Silesian Basin, Lower Silesian Basin, and Lubin Basin	200,000. 2.
Lignite	State Coal Agency	4 open pit mines at Turow	75,000.
Copper: Concentrate (gross weight)	Kombinat Gorniczo Hutniczy Miedzi (KGHM)	Mines and concentrators at Konrad, Lubin, Polkowice, Pudna, and Sieroszowice	1,900.
Metal, refined	KGHM	Refineries at Glogow I, Glogow II, and Legnica	430.
Ferroalloys	Ministry of Industry	Plants at Laziska, Bobrek, Siecznice, and Pokoj producing FeMn, FeSiMn, FeSi, FeCr, and FeW	270.
Lead-zinc:			
Concentrate	do.	Nonferrous Metals Association (Mines and concentrators at Boleslaw, Orkuz-Pomorzany, and Trzebionka)	125 Pb. 225 Zn.
Metal:			
Pb, refined	do.	Smelters and refineries at Miasteczko Slaskie, Szopienice, and Orzel Bialy	115.
Zn, refined	do.	Smelters and refineries at Boleslaw, Silesia, and Szopienice	145.
Natural gas (million cubic meters)	Ministry of Mining and Energy	Gasfields at pre-Carpathian foothills Carpathian Mountains Lowlands, near Ostrow Wielkopolski, Poznan, and Trzebnica, north of Wroclaw	6,000.
Petroleum (million barrels):			
Crude	do.	Oilfields in northern lowlands, near the Baltic Sea; sub-Carpathian and Carpathian Mountains	1.4.
Refined	do.	Refineries at Glinik, Mariampolski, Jasto, Jealicze, Warinsky, Czechowice, Gdansk, etc.	125.
Salt, all types	Ministry of the Chemical Industry	Main mines at Inowroclaw, Klodowa, and Wapno in central Poland	6,500.
Silver	Zaklady Metalurgiczne Trzebinia	Refined from dore produced by the Szopienice Pn-Zn smelter-refinery largely from KGHM supplied slimes	1.
Steel	Ministry of Metallurgy	Main facilities include integrated ironworks and steelworks at Krakow, Katowice, and Warsaw	18,000.
Sulfur	Ministry of the Chemical Industry	Kopalne i Zaklady Przetworcze Siarki im. M. Howotki "Siarkopol" at Tarnobrzeg operates the Grzybow Jeziorko and Machow Mines	5,700.

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THE MINERAL INDUSTRY OF

PORTUGAL

By Harold R. Newman

Portugal, on the Iberian peninsula, is one of the most mineralized areas of Western Europe and geologically very complex. The mineral industry of Portugal is modest by world standards; however, its growth rate during the past few years has made it one of the country's dynamic industrial sectors.

The industry has undergone important changes with the discovery and development of the rich copper and tin deposit at Neves-Corvo. When the mine reached full production in 1991, there was a major increase in European copper and tin production. The country was also a significant tungsten producer.

The Government stated it was proceeding with legislation that would privatize many public companies. The privatization issue was part of a broader program to reduce the role of the state and to restructure the Portuguese economy from one that is state-controlled to one that is market-driven.

Of interest to the mineral industry is the privatization of the mining conglomerate Empresa de Desenvolvimento Mineiro (EDM) which was scheduled for 1997. EDM is a holding company for state-owned interests in a number of mining concerns, including Sociedade Mineira de Neves-Corvo S.A.R.L. (Somincor). It also has controlling interest in Pirites Alentajanas and Empressa Nacional de Uranio.

Somincor continued to produce copper and tin at the Neves-Corvo Mine. Pirites Alentejanas S.A.R.L. was the largest producer of pyrite; Siderúrgia Nacional S.A.R.L. (SN) produced iron and steel; Beralt Tin and Wolfram (Portugal) Ltd. continued tungsten production; and Cimentos de Portugal, S.A. was an important producer of cement.

With the exception of copper, ferroalloys, dimension stone, tin, and tungsten, which were of international importance, production of other minerals and related materials had only domestic significance. There was potential for increased production of granite, marble, and slate. *(See table 1.)*

In 1994, the latest year for which complete data were available, Portugal's major markets continued to be France, Germany, and the United Kingdom, while its major suppliers were Germany, Spain, and France, respectively.

By world standards, the mineral industry of Portugal has been modest; however, the country was a significant producer of copper and tin from Somincor's Neves-Corvo Mine.

Most of the large mineral resource companies were owned or controlled by the Government, although there were some privately owned operations. About 32,000 people were employed by the mineral industry, including mining and processing. *(See table 3.)*

Somincor was 51% Government-owned through EDM. The minority partner was RTZ Corp., a United Kingdom company that owns 49% of the joint venture. The mine was designed to produce 1.3 Mt/yr of raw ore to yield 500,000 t/yr of concentrate averaging 26% copper content. The estimated life of the mine, based on estimated proven reserves, was 20 years.

The Neves-Corvo complex consisted of four proven ore bodies: Graca, reported by the company to be averaging 10% copper; Corvo, ranging from 7% to 10% copper; Neves, averaging 1% copper; and Zambujal, a complex sulfide ore of copper, lead, and zinc. Zinc was also associated with the other three deposits, reportedly averaging 10% in the Graca ore body.

Recovery of tin-in-concentrate has stabilized at Neves Corvo at around 4,000 to 5,000 t/yr. As Neves Corvo is primarily a copper mining operation, Somincor considers tin more as a byproduct.

Pirites Alentejanas S.A.'s metals concentrate plant at Aljustrel was on-stream in 1995 and the company stated it had planned to process up to 1.2 Mt/yr of copper, zinc, and lead-silver ore from its Moinho orebody. However, the company stated that technical problems affected the plant operation so that the planned levels of production of mineral concentrates recovered from pyrites produced by the mine were not attained. At yearend, the company was continuing with efforts to solve the problems.

The Portuguese iron and steel operation was nationalized in 1975 to function as a public entity incorporated as Siderúrgia Nacional Empresa de Productos Planos (SN-Planos). The Government changed SN-Planos into a public, limited company as a major step toward privatization.

A proposal by Lusosider, the joint venture of Hoogovens Group BV of the Netherlands and Sollac, a division of Usinor Sacilor SA, of France, to acquire the state's holdings has been given the go-ahead by the Portuguese government. The stated plan is for Lusosider to develop SN-Planos into a modern, efficient producer of cold-rolled and galvanized sheet and tinplate with a 300,000 t/yr capacity.

Beralt Tin and Wolfram (Portugal) S.A. was the only producer of tungsten in 1995. Beralt was proceeding with development work at its Panasqueira Mine at Barroca Grande to improve efficiency and increase the life of the mine. Most of the work was directed toward the final treatment of concentrates. The old plant for final treatment of concentrates was being moved to the main zone of

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operation at Barroca Grande and modernized to increase capacity and improve efficiency. Beralt also has a small production of byproduct copper and tin concentrates.

The industrial minerals sector was a modern and efficient producer of a variety of materials, most notably ceramics and dimension stone. The dimension stone industry continued as a very important segment of the mining industry in terms of value and was developing an import/export trade. Marble was the most valuable of the stone products and accounted for about 68% of stone production. The main area for marble mining continued to be the district of Evora.

Demand for cement continued as the building and construction industry maintained its levels of activity. This situation was expected to continue given the substantial volume of work anticipated to be necessary in coming years to develop Portugal's infrastructure.

Coal accounted for about 4% of total energy consumption. Most coal was imported although there are some domestic reserves. Empresa Carbonifera de Douro S.A., a state-owned company, operated the Germunde Mine at Castelo de Paiva. The mine produced 200,000 t/yr of anthracite coal. However, the Government was planning to close the mine at yearend 1996 because of high production costs and difficult mining conditions.

Coal demand was growing because the electricity sector was switching from oil. There were no natural gas reserves and no nuclear powerplants in Portugal. Hydropower accounted for about 45% of electricity generation. The Government sought to diversify its energy sources and increase electrical power capacity to meet consumption growth.

The Administracao do Porto de Sines initiated a program to build a terminal at the Port of Sines principally for steam coal imports by Electricidade de Portugal for electricity generation. The two major cement producers, Cimpor and Secil, also used coal as a major fuel source.

The transportation network included 3,613 kilometer (km) of railroad, most of which was operated by the state-owned Portuguese Railroad Co. (CPR). Most of the trackage was single-track, 1.665-meter (m) gauge, of which about 15% is electrified. CPR was planning to match the European gauge width, 1.433 m, on a number of key routes throughout the country. It was expected this would be done by adding a track to the existing lines.

The Government was planning to invest about $22.4 billion in infrastructure improvements during the next few years. The main thrust would be the modernization of the country's ports. Major seaports were Lisbon, Porto, and Sines. These ports were considered very important in a country where the main movement of goods was by sea. Other areas to be improved included the highways and bridges of the national motorway network. Portugal had about 74,000 km of usable highways, of which 84% was paved.

The present structure of the mineral industry could change in the near future because of significant mining exploration in progress by several foreign companies. Copper, gold, kaolin, lead, lithium, pyrites, and tin were some of the minerals targeted for exploration.

The Iberian Pyrite Belt, which extends from the southwest coast of Portugal near Setubal to the Guadalquivir River near Seville, Spain, was a prime area for this exploration activity.

There were 39 exploration contracts signed with various companies, foreign and Portuguese, of which 22 were for metallic minerals, 13 for non-metallic, 3 for mineral waters and 1 for geothermal resources . However, in the short term, Portugal was expected to be a net importer of its mineral resources requirements.

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TABLE 1
PORTUGAL: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity		1991	1992	1993	1994	1995 e/
METALS						
Arsenic, white e/		200	150	150	125	125
Beryl concentrate, gross weight e/		4	4	4	5	5
Copper:						
Concentrate:						
Gross weight		656,549	609,242	615,189	534,516	536,724
Cu content		157,572	152,311	153,797	133,629	134,181
Metal: e/						
Smelter, secondary		2,000	1,000	1,000	--	--
Refined, primary		300	--	--	--	--
Gold, mine output, Au content e/	kilograms	160	89	-- r/	--	--
Iron and steel:						
Iron ore and concentrate:						
Gross weight, manganiferous		16,067	14,500	16,200	14,330	16,000
Fe content, manganiferous		5,949	5,365	6,114	5,417	5,500
Metal:						
Pig iron	thousand tons	251	402	398	415	400
Crude steel	do.	573	769	775	749	800
Lead, refined, secondary e/		5,000	7,400	8,300	8,000	8,000
Manganese, Mn content of iron ore e/		1,200	500	500	500	500
Silver, mine output, Ag content	kilograms	43,820	39,454	36,000	31,800	32,000
Tin:						
Mine output, Sn content		8,333	6,560	5,334	4,332	8,467
Metal, primary and secondary e/		1,000	1,000	1,000	1,000	1,000
Titanium, concentrates: e/						
Gross weight		40	30	20	20	--
Content of TiO2		9	10	5	5	--
Tungsten, mine output, W content e/		971	1,126	768	60	1,511
Uranium concentrate, U content e/		32	29	33	28	22
Zinc, smelter, primary e/		2,100	2,200	2,600	3,000	3,000
INDUSTRIAL MINERALS						
Barite e/		1,000	378	350	50	100
Cement, hydraulic	thousand tons	7,473	7,638	7,600	7,500	7,500
Clays:						
Kaolin 2/		149,788	125,000	100,000	181,933	200,000
Refractory e/		301,160	300,000	300,000	431,967	300,000
Diatomite e/		2,410	1,850	1,860	2,150	2,000
Feldspar		93,000	99,645	90,547	92,440	74,000
Gypsum and anhydrite e/		359,355	416,824	458,112	450,000	450,000
Lime, hydrated and quicklime e/		200,000	200,000	200,000	200,000	200,000
Lithium minerals, lepidolite		12,433	15,904	13,289	11,352	12,000
Nitrogen, N content of ammonia e/		198,000	100,000	91,000	100,000	100,000
Pyrite and pyrrhotite (including cuprous), gross weight		12,433	14,000	14,000	14,000	12,000
Salt: e/						
Rock		525,000	592,485	524,540	519,432	544,647
Marine		125,000	125,000	125,000	125,000	125,000
Total		650,000	717,485	649,540	644,432	669,647
Sand e/		5,000	5,000	5,000	5,000	5,000
Sodium compounds, n.e.s.: e/						
Soda ash		150,000	150,000	150,000	150,000	150,000
Sulfate		50,000	50,000	50,000	50,000	50,000
Stone: e/						
Basalt	thousand tons	194	100	100	530	100
Calcareous:	do.					
Dolomite	do.	178	150	150	471	150
Limestone, marl, calcite	do.	21,309	20,000	15,000	33,134	15,000
Marble	do.	947	900	939	935	800
Diorite	do.	593	1,000	1,000	1,029	1,000
Gabbro	do.	3,753	2,500	1,000	132	100

See footnotes at end of table.

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TABLE 1--Continued
PORTUGAL: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity		1991	1992	1993	1994	1995 e/
INDUSTRIAL MINERALS--Continued						
Stone e/--Continued:						
Granite	thousand tons	12,681 r/	12,000	8,500	17,360	10,000
Graywacke	do.	18	20	20	138	20
Ophite	do.	74 r/	50	50	110	50
Quartz	do.	7	8	9	14	12
Quartzite	do.	600	500	500	526	500
Schist	do.	101 r/	100	100	273	100
Slate	do.	24 r/	50	61	40	30
Syenite	do.	33 r/	30	30	58	25
Sulfur: e/						
Content of pyrites		5,670 r/	5,000 r/	5,000	5,000	5,000
Byproduct, all sources		4,000	4,000	4,000	4,000	4,000
Total		9,670	9,000	9,000	9,000	9,000
Talc		10,794 r/	9,166	9,054	8,367	8,400
MINERAL FUELS AND RELATED MATERIALS						
Coal, anthracite e/	thousand tons	202	221	216	148	140
Coke, metallurgical e/	do.	160	150	150	150	150
Gas, manufactured e/	million cubic meters	136	130	125	125	125
Petroleum refinery products: e/						
Liquefied petroleum gas	ousand 42-gallon barrels	4,500	4,600	4,500	4,600	4,600
Gasoline	do.	10,000	12,000	14,000	15,000	15,000
Jet fuel	do.	5,000	5,200	5,000	5,000	5,000
Kerosene	do.	225	230	225	225	225
Distillate fuel oil	do.	22,000	21,000	20,000	20,000	20,000
Residual fuel oil	do.	21,000	20,000	20,000	20,000	20,000
All other products	do.	9,000	8,600	8,800	9,000	9,000
Refinery fuel and losses	do.	3,800	3,400	3,500	3,500	3,500
Total	do.	75,525	75,030	76,025	77,325	77,325

e/ Estimated. r/ Revised.
1/ Table includes data available through Mar. 1996.
2/ Includes washed and unwashed kaolin.

TABLE 2
PORTUGAL: STRUCTURE OF THE MINERAL INDUSTRY FOR 1995

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of facilities	Annual capacity
Cement		Cimentos de Portugal S.A. (Cimpor) (Government,100%)	10 plants, various locations	6,000
Coal		Empressa Carbonifera de Duro S.A.R.L. (ECD) (Government, 100%)	Germunde Mine at Castello de Pavia	250
Copper		Sociedade Minera de Neves-Corvo S.A. (Somincor) (Government, 51%; RTZ Corp., 49%)	Neves-Corvo Mine near Castro Verde	500
Diatomite		Sociedade Anglo-Portugesa de Diatomite Lda.	Mines at Obidos and Rolica	5
Feldspar		A.J. da Fonseca Lda.	Seixigal Quarry, Chaves	10
Ferroalloys		Electrometalurgia S.A.R.L. (Eurominas)	Plant at Setubal	100
Petroleum, refine	barrels per day	Petroleos de Portugal (Petrogal) (Government 100%)	Refineries at Lisbon, Porto, and Sines	300,000
Pyrite		Pirites Alentejanas S.A.R.L. (Eurominas)	Plant at Setubal	100
Steel, crude		Siderugia Nacional S.A.R.L. (SN) (Government 100%)	Ironworks and steelworks at Seixal and Mai	1,000
Tin		Sociedade Mineira de Neves-Corvo S.A. (Somincor) (Government 51%, RTZ Corp. , 49%)	Neves-Corvo Mine near Castro Verde	5
Tungsten		Beralt Tin and Wolfram (Portugal) Ltd. (Minorco S.A., 91%; Government 9%)	Mine and plant at Panasqueira	1,600
Uranium	tons	Empressa Nacional de Uranio (ENU)	Mines and plant at Guargia	170
Zinc, refined		Quimigel E.P. (Government 100%)	Electrolytic plant at Barreiro	11

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THE MINERAL INDUSTRY OF

ROMANIA

By Walter G. Steblez

In 1995, Romania continued to be an important regional producer of petroleum and natural gas. The country also was a modest producer of copper, lead and zinc, manganese, steel, and ferroalloys, as well as a broad range of industrial minerals. Romania's economy continued to stabilize during the year. In 1995, the growth rate of the GDP was expected to reach 5% and the annual rate of inflation to be reduced to about 30%.[1] By comparison, in 1992, the country's GDP showed a negative growth rate of about 8.8% and a rate of inflation in excess of 210%. In common with most former centrally planned economy countries, Romania's transition from a system of central economic planning to a market economy was marked by economic dislocations such as steep decreases in industrial production and rapid growth in unemployment and inflation. The country's economic stabilization in 1994-95 largely was the result of structural economic adjustments carried out by the Government of Romania that were consonant with proposals developed by the World Bank. In 1995, industrial production was reported to have increased slightly compared with that of 1994.[2] Major activities in Romania's mineral industries included new planned investment in the steel industry and the discovery of new gas deposits in the Black Sea.

The Government's National Agency for the Privatization and Development for Small-and Medium-Sized Enterprises was the country's designated agency for denationalizing and privatizing state-owned industries. Formerly centralized state-owned enterprises were grouped into state-owned commercial companies, joint-venture enterprises with foreign participation, and the so-called "Regies autonomes." The designation "state commercial company" included small- to mid-sized enterprises that were to be in the process of denationalization. The "Regies autonomes" included utilities, such as telecommunications, electric power industry, postal services, and mass transportation; military industries; and mining and mineral industries. "Regies autonomes" were to continue to be owned and operated by the Government, but would be able to lease or sell some assets to increase profitability.

In Romania, primary environmental regulations, contained within the 1973 Law on the Environment (Law No. 9), outlined the basic provisions concerning the country's environmental protection. Many of the environmental protection provisions in this legislation generally had been considered too strict to be enforceable, especially those pertaining to ambient air quality standards. After 1989, the Government of Romania established the Ministry of the Environment (Law 264/1991, Ministerul Medliului); its principal responsibilities were to include enforcement of environmental regulations through inspections and levies of fees and fines. In recent years, Romania has had several "hot spots" of environmental pollution in Eastern Europe that included industrial centers associated with the production of nonferrous metals such as Baia Mare, Copsa Mica, and Zlatna.

In 1995, the production of most minerals in Romania appeared to have stabilized. The sharp curtailment of state subsidies to industry during the 1990-92 period, especially for purchases of energy that were significantly below world market prices, resulted in a radical readjustment of output goals of most of the country's mineral industries. In 1994-95, the output levels for most minerals reflected energy input prices that were more in accord with world market values. In 1995, Romania's entire mineral industry continued to be owned and operated by the state either as directly government-owned entities or as state-controlled corporations or companies in the process of denationalization. (*See table 1.*) The information provided in table 2 lists the names of administrative bodies as well as subordinate production units of the chief branches of the country's mineral industry. (*See table 2.*)

According to published trade returns for 1994, the total value of Romania's exports amounted to about US$5.9 billion, an increase of 22.6% compared with that of 1993. The value of exports of basic metal (iron and steel and nonferrous metals) accounted for about 17.6% of total exports. Exports of industrial minerals, such as cement, lime, sand and gravel, salt, stone, and sulfur amounted to 1.2% and fuels, waxes and mineral oils to 10.2%. Exports of chemical products, including fertilizers, amounted to about 8% of Romania's total exports for 1994.[3] In terms of volume, export data provided for select mineral products for 1994 show substantial export increases compared with similar reported exports for 1993. In 1994, exports of iron and steel pipes increased by 39% to 108,212 tons, salt by about 19% to 292,912 tons, soda ash by 55% to 259,266 tons, and petroleum coke by about 78% to 209,852 tons.[4]

Official trade returns for 1994 also showed Romania's total imports to have decreased by 3.5% compared with those for 1993 to US$ 6.3 billion.[5] Aggregated commodity

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groups, such as iron and steel and nonferrous metals accounted for about 5.4% of the value of total imports; industrial mineral products that included cement, lime, salt, sand and gravel, stone, and sulfur amounted to about 1%; fuels, about 22%; and chemicals, about 8.5% of the total value of imports for 1994. Imports of iron ore in 1994 rose sharply by about 53%, compared with those of 1993, to 5.3 Mt. Imports of coal and natural gas both increased by 28% and 3%, respectively, to 4.1 Mt and 4,720 million cubic meters (m^3). Romania's imports of sulfur amounted to 46,366 ton, a decline of 161%, compared with that of 1993. Preliminary records for 1994 showed crude petroleum imports falling by 33% to 3.8 Mmt.[6] Germany, Russia, and Italy were the three leading exporters to Romania, accounting for about 20.2%, 13.6%, and 12.8%, respectively, of the total value of Romania's imports in 1994. Germany, Italy and France were the leading importers of Romania's goods in 1994, accounting for 15.8%, 12.7%, and 5.1%, respectively, of Romania's total exports.

Almost 10% of the country's industrial labor force was employed in the mining and extractive sectors of industry.[7] Industrial sectors involved in processing metals, industrial minerals, and fuels additionally accounted for more than 11% of the country's industrial labor force. With about 50,000 workers employed in the country's metals mining and processing industry, the mining and processing of iron ore and nonferrous metals remained important activities for Romania's economy. Romania operated both open pit and underground bauxite mines at Dobresti-Oradea. The Tulcea refinery exclusively produced metallurgical-grade alumina, while the Oradea refinery produced a small quantity of hydrated alumina in addition to the metallurgical-grade product. The country's only primary aluminum smelter was at Slatina in the southeastern part of the country. The Slatina Aluminum Enterprise had an installed capacity of 150,000 t/yr from six potlines, each rated at 25,000 t/yr.

Romania continued to mine copper largely in two districts: the northeastern part of the country that included mines at Baia Sprie, Cavnic, and Lesul Ursului, and in the southwestern part of the country, with major mines at Moldova Noua, Rosia Poieni, and Rosia Montana. Generally, the grade of ore has been low, with major producing mines (Moldova Noua and Rosia Poieni) hoisting ore grading about 0.35% Cu or less. Concentrates from these areas have been smelted and refined at Baia Mare and Zlatna. The serious pollution problems associated with the country's metals sector continued to affect the country's copper industry as well. The volume of fugitive flue and other gases at the Baia Mare smelter reportedly continued to be severe as was the volume of dust leaked into the environment. The former effluent contained up to 6% Zn and 2% Pb as well as large quantities of cadmium. The major issue at Baia Mare has been the use of copper concentrates that were beyond the capacity of the smelter to handle.[8] In 1995, plans to modernize the Baia Mare copper flash smelter were becoming realized with the conclusion of a contract worth US$2.8 million between Phoenix SA and Metanef SA of Romania and Outokumpu Engineering Contractors Oy of Finland for engineering services and equipment. Originally built under licence from Outokumpu in 1962, work on the flash smelter's modernization reportedly began in May, 1995.[9] Relatively low-grade lead and zinc ore was produced at underground mines in the Baia Mare, Borsa, Certej, and Rodna Districts, grading from 0.4% lead and 0.6% zinc to 1.0% lead and 1.2% zinc. Moreover, Romania's lead and zinc ores also contained copper (0.35%), as well as associated antimony, bismuth, cadmium, gold, and silver. Owing to the complex mineralogy of the lead and zinc ores, concentrates produced from them were of uneven quality. Reportedly, recovery in concentrate for both lead and zinc has ranged between 50% and 75%. In December, severe flooding was reported in central Transylvania, which may have had a negative effect on lead and zinc mining and smelting operations in the region.[10] Romania's government-owned Rare Metals Enterprise has mined uranium underground in the Apuseni Mountains near Baita Bihor since 1980. Reportedly, total mine production in 1994 was about 125 t of uranium oxide contained in 110,000 t of ore. The country's production of uranium has been earmarked for use at the Cernavoda nuclear powerplant upon completion. All of Romania's uranium ore was designated for shipment to the Feldiora mill in Brasov for processing, which uses an alkaline-based circuit to produce a uranium concentrate with a 60% uranium metal content. The concentrate is further treated to produce a sintered uranium oxide that is suitable for fabrication into fuel.[11]

Following the Government of Romania's approval in 1994 of a reorganization plan for the country's steel industry for the 1994-2002 period, spokespersons for the Sidex SA Galati steel complex in 1995 announced a 10-year plan to modernize the Galati facility. The modernization cost of the country's largest steel producer was set at approximately US$1.5 billion.[12] To assist Romania in the country's effort to restructure the steel industry, the Brussels-based Romania-European Union Steel-Processing Contact Group established a technical aid program. In part, the technical aid program would help establish steel products standards for Romania's exports to the European Union.[13]

Romania's extensive output of industrial minerals apparently was sufficient to meet most domestic needs. Barite, bentonite, diatomite, feldspar, graphite, gypsum, kaolin, and limestone, among others, were mined at about 60 deposits throughout the country. Industrial minerals were expected to play an increasingly important role in the country's economy. The need to modernize the country's

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economy and infrastructure will increase demand for asbestos, cement, clays, dimension stone, and other industrial minerals.

In respect to mineral fuels, industry officials have indicated that total recoverable reserves of petroleum at deposits currently under exploitation in Romania amounted to about 206 Mt, which would be sufficient to last more than 30 years at a production rate of 6.5 Mt/yr. It was believed that additional significant resources of both natural gas and petroleum could be found in structures at depths greater than 3,000 (m). Romania, perhaps the world's oldest petroleum producer, reached its apogee of both petroleum and natural gas production in 1976, when the country produced more than 14 Mt of petroleum and 1.33 trillion cubic feet of natural gas. From 1976 through 1989, Romania's output of both commodities had declined reportedly by more than 40%. The decline of production was attributed to depletion as well as to outdated oilfield technology.[14] In 1995, the Government of Romania announced plans to create a large energy company, Petrorom, that would oversee 10 petroleum refineries, an exploration unit, 4 pipelines, 3 research units, and 41 distribution companies.[15] Reportedly, Petrorom also was to help coordinate the operations of the country's oil and gas industry and assist in its privatization by facilitating domestic and foreign investment. In April, Enterprise Oil Exploration Co. of the United Kingdom reportedly completed testing the operations of the Doina-2 derrick 115 km. east of Constanta. It was determined that a substantial offshore natural gas deposit had been found.[16] Reportedly, the daily discharge of natural gas at the site amounted to 497,000 m^3.

According to Romanian Government sources, Romania's import of natural gas from Russia in 1995 would amount to about 7 billion m^3. This was based on a contractual arrangement reached between Romania and Russia's Gazprom and Gazexport, which called for full payment in hard currency for Russian natural gas shipped to Romania in 1993, for which Romania's debt was outstanding. Payment for natural gas shipments in 1995 from Russia to Romania would be made both in cash and on a barter basis.[17] In early 1995, Romania reported the creation of an equal partnership joint venture between Romgaz and Wintershall of Germany to set up an import and distribution system for Russian gas.[18]

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[1] Preliminary data: The World Bank: Report No.-6672-RO Report and Recommendations of the President of the International Bank for Reconstruction and Development...Viz. Romania, Dec. 6, 1995, p. 4.
[2] FBIS-EEU-96-042-S Mar. 1, 1996, p. 21; from ROMPRES, 1405 GMT Feb. 5, 1996.
[3] Foreign Trade Statistics No. 12/1994.
[4] Work cited in footnote 3.
[5] Work cited in footnote 3.
[6] Work cited in footnote 3.
[7] Anuarul Statistic Al Romaniei 1994, pp. 502-503.
[8] CRU Copper Studies, 1992, p. 11.
[9] E&MJ 3/95, p. 22.
[10] Mining Journal (London), Jan. 12, 1996, p. 25.
[11] ___. Feb. 10, 1995, p. 99.
[12] ___. Oct. 6, 1995, p. 255.
[13] FBIS-EEU-95-083-S May 1, 1995, p. 44; from ROMPRES,Bucharest, 1602 GMT Mar. 2, 1995.
[14] BBC SWB EEW/0339, June. 30, 1994, p. WB/5, from Rompres New Agency, Bucharest, 1117 gmt, June. 20, 1994.
[15] Oil & Gas Journal, June 19, 1995, p. 27.
[16] FBIS-EEU-95-083-S May 1, 1995, p. 48; from ROMPRES 1554 GMT April 14, 1995.
[17] FBIS-EEU-95-083-S, May 1, 1995, p. 46; from ROMPRES 0925 GMT, Mar. 13, 1995.
[18] Petroleum Economist, Jan., 1995, p. 34.

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TABLE 1
ROMANIA: PRODUCTION OF MINERAL COMMODITIES 1/ 2/

(Metric tons unless otherwise specified)

Commodity		1991	1992	1993	1994	1995 e/
METALS						
Aluminum:						
Bauxite, gross weight		200,000	175,000	186,000	184,100 r/	174,300 3/
Alumina, calcined, gross weight		310,000	280,000	293,000	301,576 r/	323,415 3/
Ingot including alloys:						
Primary		160,000 e/	112,000	116,000	119,600 r/	141,500 3/
Secondary		7,000	6,710	3,700	2,814 r/	3,397 3/
Total		167,000	118,710	119,700	122,414 r/	144,897 3/
Bismuth, mine output, Bi content e/		55	50	40	40	40
Cadmium metal, smelter e/		10	10	10	4 r/	5
Copper:						
Mine output, Cu content		26,400	24,700	25,300	26,034 r/	24,003 3/
Metal:						
Smelter:						
Primary		27,800 e/	23,400	25,200 e/	23,499	23,345 3/
Secondary e/		1,000	1,000	1,000	1,000	1,000
Total		28,800	24,400	26,200	24,499	24,345
Refined:						
Primary e/		29,800	21,000	22,000	22,113 r/ 3/	22,013 3/
Secondary e/		4,000	3,080	3,000	4,600 3/	5,000
Total 3/		33,800	24,080	25,000	26,713	27,013
Gold, mine output, Au content e/	kilograms	3,000	3,700 3/	4,000	4,000 3/	4,000
Iron and steel:						
Iron ore:						
Gross weight	thousand tons	1,461 r/	1,229 r/	855	951 r/	710
Metal content	do.	199	180	130	198 r/	184 3/
Metal:						
Pig iron	do.	4,525 r/	3,111 r/	3,189 r/	3,496 r/	4,203 3/
Ferroalloys: e/						
Ferrochromium 3/		20,400	6,980	3,910	3,885 r/	15,053 3/
Ferrosilicon		30,000 3/	23,300 3/	23,600	28,385 3/	19,320 3/
Ferromanganese		40,000 3/	27,100 3/	16,400	31,295 r/ 3/	28,410 3/
Ferrosilicomanganese		30,000 3/	28,200 3/	22,000	35,215 3/	57,149 3/
Silicon metal		1,000 r/	430	400	300	300
Steel, crude	thousand tons	7,130	5,376 r/	5,446 r/	5,800 r/	6,555 3/
Semimanufactures:						
Pipes and tubes	do.	627	449	414	472	548 3/
Rolled products	do.	5,161 r/	3,865 r/	4,092 r/	4,510 r/	4,956 3/
Lead:						
Mine output, Pb content		16,177 r/	16,697 r/	16,929 r/	23,838 r/	20,506 3/
Smelter, primary		10,300	13,900	9,000 r/	12,000 e/	12,000
Refined:						
Primary		13,200	14,400	11,800	22,000	22,000
Secondary		4,000	1,750	5,610	4,000	4,000
Total		17,200	16,150 r/	17,410 r/	26,000	26,000
Manganese:						
Ore, gross weight	thousand tons	120 e/	100	125	137	130
Concentrate: 4/						
Gross weight	do.	20	15	15	108 r/	104
Mn content	do.	5	4	4	28	27 3/
Silver, mine output, Ag content		80	73	70	70	60
Zinc:						
Mine output, Zn content		26,322 r/	25,813 r/	28,017 r/	35,357 r/	34,730 3/
Metal, smelter, primary and secondary		8,740 r/	11,600 3/	14,100	18,500	18,000
INDUSTRIAL MINERALS						
Barite, run of mine		70,000	118,000	12,100	104,700 r/	105,000
Cement, hydraulic	thousand tons	6,692 r/	6,271 r/	6,240	6,676 r/	6,700
Clays: e/						
Bentonite:						
Run of mine		150,000	120,000	120,000	100,000	100,000
Marketable		60,000	50,000	50,000	41,056 3/	42,268 3/
Kaolin:						
Run of mine		250,000	200,000	200,000	150,000	150,000
Marketable		70,000	60,000	60,000	47,566 3/	49,116 3/

See footnotes at end of table.

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TABLE 1–Continued
ROMANIA: PRODUCTION OF MINERAL COMMODITIES 1/ 2/

(Metric tons unless otherwise specified)

Commodity		1991	1992	1993	1994	1995 e/
INDUSTRIAL MINERALS–Continued						
Diamonds, synthetic industrial	thousand carats	3,000	–	–	– e/	–
Diatomite		30,000	14,500	9,970	34,858 3/	48,320 3/
Feldspar		40,000	27,700	87,700	31,123 3/	30,882 3
Fluorspar e/		12,000	15,000	15,000	15,000	15,000
Graphite		6,000	2,300	3,160	2,335 3/	2,180 3/
Gypsum e/	thousand tons	800 r/	800	100	124 r/ 3/	98 3/
Lime	do.	2,334 r/	1,946 r/	1,738 r/	1,621 r/	1,747 3/
Nitrogen, N content of ammonia	do.	1,128 r/	1,421 r/	1,328 r/	–	1,000
Pyrites, gross weight	do.	900	965	560	350 r/	250
Salt:						
Rock salt e/	do.	1,000	966 r/	808	892 3/	302 3/
Other	do.	2,260 r/	1,590 3/	1,380	1,310	1,300
Total	do.	3,260 r/	2,556 r/	2,188 r/	2,202 r/	1,602
Sand and gravel	do.	4,000 e/	4,000	4,400	831	901 3/
Sodium compounds, n.e.s.:						
Caustic soda	do.	461	372	330	298	371 r/
Soda ash, manufactured, 100% Na_2CO_2 basis	do.	471	452	371	449 r/	350
Sulfur:						
S content of pyrites e/	do.	350	385 3/	225	148 r/ 3/	98 3/
Byproduct, all sources e/	do.	250	200	200	200	200
Total e/	do.	600 r/	585	425	348	298
Sulfuric acid	do.	745	572	527	491 r/	477 3/
Talc		10,000 e/	6,330	9,000	8,952 r/	9,976 3/
MINERAL FUELS AND RELATED MATERIALS						
Carbon black		47,000	27,000	27,400	19,325 r/	21,555 3/
Coal:						
Run of mine:						
Anthracite and bituminous	thousand tons	5,410	5,620	5,760	6,748 r/	7,417
Brown	do.	645	622	601	450	400
Lignite	do.	29,100	35,000	36,100	36,000	36,000
Total	do.	35,155	41,242	42,461	43,198	43,817 3/
Washed (produced from above):						
Anthracite and bituminous:						
For coke and semicoke production	do.	953	1,030	465	444 r/	349 3/
For other uses	do.	2,880	3,070	3,760	921 r/	800 3/
Brown	do.	612	610	573	–	– 3/
Lignite	do.	28,000	33,700	35,000	39,182	39,979 3/
Total	do.	32,445 r/	38,410 r/	39,798 r/	40,547 r/	41,128 3/
Coke:						
Metallurgical	do.	2,388 r/	2,648 r/	2,403 r/	2,664 r/	3,144 3/
Other	do.	300 e/	260	198	–	–
Total	do.	2,688 e/	2,908	2,601 r/	2,664 r/	3,144 3/
Fuel briquets (from brown coal) e/	do.	450	400	70 3/	71 3/	75
Gas, natural, Gross						
Associated	million cubic meters	8,310 e/	7,000 e/	7,000	1,499 r/	1,471 3/
Nonassociated	do.	16,500 e/	15,100 e/	14,300 e/	18,099 r/	17,541 3/
Total	do.	24,810 r/	22,100	21,300	19,598 r/	19,012 3/
Petroleum:						
Crude:						
As reported	thousand tons	6,790	6,620	6,680	6,737 r/	6,712 3/
Converted	thousand 42-gallon barrels	51,000	49,600	50,600	50,460 r/	50,270
Refinery products e/	do.	99,900	95,000	95,000	115,200 r/	113,830 3/

e/ Estimated. r/ Revised.

1/ Includes data available through May 1996.

2/ In addition to the commodities listed, antimony, asbestos, and a variety of crude construction materials are produced, and molybdenum may have been produced as a byproduct of copper from 1988 on; output is not reported quantitatively and available information is inadequate to make reliable estimates of output levels.

3/ Reported figure.

4/ Estimated series were based on published data on concentrate production.

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TABLE 2
ROMANIA: STRUCTURE OF THE MINERAL INDUSTRY FOR 1995

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies	Location of Main facilities	Annual capacity
Alumina		Soc Com Alor SA	Plant at Oradea, near Hungarian border	250
Do.		Dept. of Nonferrous Metals	Plant at tulcea, Danube Delta	270
Aluminum, primary		Alro SA (Slatina Aluminium Enterprise)	120 kilometers west of Bucharest	270
Barite		Ministry of Industry	Ortra mine, Rosia Montana, southwest of Cluj	100
Bauxite		do.	Oadea-Dobresti Mining Complex, near Hungarian border	350
Cement		Ministry of Industry	Tasca-Bicaz plant, near Piatra Neamt	3,000
Do.		do.	Cimpulung plant, about 60 kilometers north of Pitesti	2,000
Do.		do.	Medgidia plant, west of Constanta	1,000
Do.		do.	Pieni plant, 20 kilometers north of Tirgoviste	600
Coal:				
Bituminous		Ministry of Industry	Valea Jiului Mining Complex, near Hunedoara	10,400
Lignite		Ministry of Industry, Oltenia Mining Complex, including Rovinari Mining Enterprise	Jiu Valley, Oltenia County, north of Craiova	20,300
Do.		Ploesti Mining Complex	About 50 kilometers north of Bucharest.	8,700
Copper:				
Ore (concentrate)		Dept. of Nonferrous Metals	Baia mare, Baia-Sprie, and Cavnic mines, northwest area near Ukraine's border; Rosia Montana, Noud, Borsa Balan, and Lesul-Ursului mines--in east-west arc along Carpathian range; Rosia Poieni mines; and Moldova Noua mines, southwest near Danubian border with Yugoslavia	180
Metal		Ministry of Industry, Metallurgical enterprise for Nonferrous Metals	Baia Mare, in northwest near Ukraine's and Hungary's borders	35
Do.		do.	Zlatna smelter, Apuseni, in northwest Romania	13
Ferroalloys		Ferom-Joint Stock Co.	Complex at Tulcea	280
Iron ore		Ministry of Industry	Mining complex at Hunedoara, in west-central Romania	1,320
Do.		do.	Resita Mining Complex, southwestern Romania, near Yugoslav border	660
Do.		do.	Napoca-Cluj Mining Complex, northwestern Romania on the Somesul River	990
Lead in ore		do.	Baia Mare Mine, near Ukraine's and Hungary's borders	24
Do.		do.	Balan Mine, 50 kilometers southwest of Piatra Neamt	10
Lead metal		Metallurgical Enterprise for Nonferrous Metals	Smelter at Copsa Mica, central Romania, on the Tirnava Mare River	42
Natural gas	million cubic feet per year	Ministry of Petroleum and Gas	Tirgu Mures Field at Tirgu Mures, north-central Romania	96,000
Do.	do.	Ministry of Industry, Dept. of Energy	Ploesti Field, 50 kilometers north of Bucharest	49,000
Petroleum, crude	barrels per day	do.	Ploesti-Teleajen, Pitesti, and Tirgoviste Fields, in Prahova Valley around Bucharest; Bacau Field at Bacau, east-central Romania near the Siretul River; and West Carpathian Field, southeast Carpathian Range, between the west bank of the Olt River and Tirgu Jiu	50,000

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TABLE 2--Continued
ROMANIA: STRUCTURE OF THE MINERAL INDUSTRY FOR 1994

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies	Location of Main facilities	Annual capacity
Petroleum, refined	barrels per day	Ministry of Industry, Dept. of Energy	Refineries at Brazil, Pitesti, Onesti, Barcau, Borzesti, Brasov, Cimpina, Darmanesti, Oradea, Ploesti, Teleajen, and Navodari	64,000
Steel		Ministry of Industry; Sidex S A Galati	Danube River, north of Brail, near the Ukrainian border	10,000
Do.		Siderurgica SA Hunedoara	West-central romania, near Calan	4,000
Do.		CSR SA Resita	Southwestrn Romania, about 20 kilometers southwest of Caransebes	1,200
Do.		Siderica SA Calarasi	Near the Bulgarian border close to the Danube	600
Zinc in ore		Ministry of Industry, Baia Mare	Baia Mare, near Ukraine's and Hungary's borders	60
Zinc metal		Ministry of Industry, Metallurgical Enterprise for Nonferrous Metals	Imperial Smelter at Copsa Mica, Tirnava River, central Romania	66

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THE MINERAL INDUSTRY OF

RUSSIA

By Richard M. Levine

Russia occupies more than 75% of the territory of the former Soviet Union (FSU) and accordingly inherited a large percentage of its mineral resources. Russia is a large mineral producer, accounting for a large percentage of the FSU's production of a range of mineral products,including aluminum, bauxite, cobalt, coal, diamonds, mica, natural gas, nickel, oil, platinum-group metals, tin and a host of other metals, industrial minerals, and fuels.

Still, significant mineral deposits are located in other former republics. Russia had been significantly or entirely dependent on the output of other FSU countries for certain minerals, particularly metals from Central Asia, the Caucasus, and Ukraine. For example, Russia had to import almost all of its needs for antimony metal, chromite, manganese, mercury, and titanium and zirconium raw materials from other FSU countries. For other minerals such as alumina, copper, lead, molybdenum, and zinc, a large percentage of the production had come from other former republics. The other republics, in turn, were significantly dependent on Russia for a large percentage of their minerals, and, in particular, oil and gas, for which Russian supplies were critical. While these interdependencies were often lessened by the sharp fall in domestic consumption of practically all mineral commodities following the breakup of the Soviet Union, they nevertheless remained crucial for a number of industries.

Russia's dependencies on the other FSU countries continued in 1995. In response, Russia was attempting to develop its own domestic industries for a number of those mineral commodities that it was importing from the FSU countries. The striving to lessen dependence on FSU countries was based not only on old autarkik thinking, but also on concerns about the reliability of these new countries to be suppliers of essential raw materials.

In turn, Russia was exporting much of its mineral output to world markets rather than to the FSU both owing to the fall in domestic consumption in the FSU and Russia's need to earn hard currency. In cases where Russia was still exporting minerals to other FSU countries, it was at times incurring heavy debt from nonpayment as was the case with natural gas shipments.

The Russian economy appeared to have stopped its rapid decline in 1995 with the decrease in the gross domestic product having dropped by only 4% in comparison with that of 1994 while in 1994 this drop was 13%. In 1995, production in the minerals sector also appeared not only to have ceased falling, but to have begun to increase. The reported output of most metals and industrial minerals increased while production of mineral fuels was near the 1994 level, which was in sharp contrast to the previous 3 years when output of practically all minerals fell precipitously.

Metals output, however, was still far below capacity with capacity utilization highest in the production of aluminum, iron ore, and pig iron where it ranged between 76% to 92%, followed by steel and rolled products with about 65%, nonferrous metals production with about 60%, and steel pipe production with about 33%. The underutiliziation of capacity was increasing the cost of metal production, causing enterprises to spend proportionally higher amounts for energy and transport per unit of output.

Environmental Issues

In 1995, according to an article published in the Russian journal Tsvetnye Metally (Nonferrous Metals), August 1996, pp. 69-71, Russia's metallurgical industry was responsible for 24% of the country's pollution caused by harmful emissions into the atmosphere from stationary sources. In 1995, however, the quantity of harmful emissions released into the atmosphere by metallurgical enterprises decreased by 10% compared with that of 1994. Reportedly, Russian metallurgical enterprises averaged a 66% rate of removal of harmful substances from atmospheric emissions.

Much of the problem with pollution from metallurgical enterprises, according to this article in Tsvetnye Metally, was attributed to the fact that during the Soviet period practically all emphasis was placed on increasing production with inadequate investment made in pollution control devices and other pollution abatement measures. This problem has been greatly aggravated by the lack of funds for renovating deteriorating capital stock at metallurgical enterprises as well as by a breakdown in following production procedures necessary for containing pollution.

While during the Soviet period from about 2% to 7% of capital investment in metallurgy was devoted to pollution abatement, in the switch over to a market economy system this percentage has been reduced to almost nothing. The percentage of capital expenditure actually necessary to adequately prevent air, water, and soil pollution at

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metallurgical enterprises was estimated to be between 30% to 35% of total capital investment. This percentage does not include funds necessary to restore already damaged aspects of the environment which would greatly increase this expenditure.

In a list of 65 priority cities and industrial centers in need of pollution abatement compiled by the State Committee for Hydrometeorology, 33 of these contained ferrous and nonferrous metallurgical enterprises. These metal processing industries generally were responsible for from 50% to 90% of the pollution in these priority areas. The worst offenders were the Norilsk mining and metallurgical complex with enterprises in East Siberia and on the Kola Peninsula that mines and processes mixed sulfide ores containing nickel, copper, and a large number of byproduct metals; and the Kuznetsk, West Siberian, Magnitogorsk, Cherepovets, Novolipetsk, and Nizhniy Tagil steel mills.

The Norilsk complex was responsible for 8% of all harmful atmospheric emissions in Russia in 1995. At enterprises of the Norilsk complex located on the Kola Peninsula, which borders Scandinavian countries, the level of emissions had decreased by more than 26% compared with that of 1980. This was in accord with a transnational effort to lower the level of emissions crossing national borders. Pollution from Norilsk's enterprises on the Kola Peninsula was a matter of serious concern in neighboring Scandinavian countries. However, further reductions of atmospheric emissions from Norilsk's metallurgical enterprises on the Kola Peninsula were not deemed feasible without major renovations.

In 1995, reportedly, the volume of polluted water emitted by metallurgical enterprises decreased compared with that of 1994, although the volume of water consumption remained the same. The main sources of water pollution were many of the above named steel mills. These steel mills lacked adequate water purification facilities; and, furthermore, these facilities were often overloaded, improperly used, and in need of repair. Contaminated water emitted from enterprises of the Norilsk complex in both East Siberia and on the Kola Peninsula were major sources of water pollution in the Kara and Barents Seas.

Production

In a major change since the Soviet period, in 1995 Russia began publishing mineral production and trade data, some of which had not been available for more than fifty years. Then, in November 1995, a decree was issued which again made secret the disclosure of certain mineral production data. It must be added that even when figures were reported, at times contradictory production and trade numbers would be reported by seemingly authoritative sources. Therefore, reported numbers that appear in this report may be at variance with other published numbers, but in general the order of magnitude for the differences in reported numbers is small.

In 1995 compared with that of 1994, production increases were reported for most ferrous and nonferrous metals and for mineral fertilizers and industrial minerals, while production reportedly remained near the same level or fell slightly for fuel minerals.

Despite the increase in Russian metal production in 1995, the Chairman of the Russian Committee for Metallurgy stated that the minerals industry, which was primarily export-oriented, experienced severe economic strains because of the ruble trading band imposed in July 1995. This band established a fixed trading range for the ruble versus the dollar. This increased production costs because domestic prices in rubles for production inputs and transport could rise with inflation since they had not been kept within any band. But with ruble cost of production increasing with inflation, metals exporters were not able to earn additional rubles for their exports because the ruble had to trade within a limited exchange rate band, constraining the fall in the ruble and limiting the amount of rubles that the traders could receive for the foreign currency earned.

Trade

The increase in metals output was reflected in increased exports, while domestic metal consumption remained at the previous year's level. For Russia, limited export figures from January through October 1995 show that there was an increase in exports of practically all metals in terms of physical volume. Despite Russia's increased exports in 1995, the Russian Metallurgy Committee reported that export earnings were restricted because of the ruble trading band established in July 1995.

Along with apparently official exports, a significant amount of metals was unofficially exported in violation of Russian customs laws. In 1995, nonferrous metals comprised the largest category in value of goods being taken out of the country that had been intercepted by Russian customs agents.

An important form of mineral trade involved toll smelting and refining of metals, which allowed Russian metallurgical enterprises to stay in operation despite a shortage of working capital, low domestic demand, and low demand in traditional FSU markets. Tolling also could be more profitable than processing domestic materials to export as tolled material was exported duty free. Barter trade was still widespread in the domestic metals sector, accounting for 55% of all sales in 1995, which had the adverse affect of causing shortages of money needed to pay workers and expenses.

Commodity Review

Metals

Aluminum.—In 1995, Russia reported a 2% increase in

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aluminum production compared with 1994. Reported exports of primary aluminum in 1995 of 2.19 million metric tons (Mt) were the same as 1994 exports. Of total 1995 exports, 1.78 Mt were from toll smelted raw materials. Production of bauxite and alumina in 1995 reportedly increased by 3% and 15% respectively compared with that of 1994.

Russia, according to preliminary data, in 1995, reported importing 2,681,800 metric tons (t) of aluminum ores and concentrates, of which 1,601,400 t came from the countries outside the FSU and 1,080,400 t came from the FSU. Tolling arrangements for several years had been of major importance in aluminum production and trade. In 1993, tolled output comprised 47% of total output; in 1994, 63%; and in 1995, 65%.

The international Memorandum of Understanding (MOU), initially put into place between the European Union and the Governments of Australia, Canada, Norway, Russia, and the United States because of an oversupply of aluminum on world markets, continued in force through 1995, but ceased its functioning in early 1996.

The aluminum industry is the only Russian metals industry which has been able to maintain production at almost peak levels since the breakup of the Soviet Union. This was accomplished despite the fact that the Russian aluminum industry during the Soviet period was over 50% dependent on imported raw materials. In the case of the Russian aluminum industry, production was maintained by large exports to world markets and by control of a significant portion of the Russian aluminum industry passing into the hands of foreign investors and traders. In this manner, the Russian aluminum industry has been assured of timely supplies of raw materials and working capital. Foreign control, however, has not had as benign an effect on the Russian and other FSU bauxite and alumina industries. These industsries lost a large percentage of their customer base as the foreign firms controlling the Russian aluminum industry have had the Russian smelters toll smelt a larger percentage of imported raw materials rather than purchase Russian and other FSU raw materials.

Antimony.—Russia is in the process of developing its own antimony metal-producing facilities. All antimony metal in the FSU was produced at the Kadamzhay plant in Kyrgyzstan with much of the antimony raw material coming from Russia's Sakha/Yakut Republic. Production of antimony metal was scheduled to begin in 1996 at the Yuzhuralnikel plant in the southern Urals, which was extending its production profile from nickel to antimony and other metals. Plans called for Yuzhuralnikel to produce 3,000 metric tons per year (t/yr) of antimony, and plans call for construction of two other antimony metal production facilities in Russia.

Copper.—In 1995, refined copper production reportedly increased by 15% compared with that of 1994. The upturn in refined copper production was fueled primarily by the export market and by tolling arrangements because there was little revival of domestic demand. Copper exports increased significantly between 1993 and 1994 with copper exports reported at 164,000 t in 1993 and 470,000 t in 1994. In 1995, copper exports decreased slightly to 464,000 t.

Russia's two main copper-producing regions are the Norilsk complex in East Siberia, which extracts over 60% of the total copper mine output, and the Urals region, which mines about 30% of the total.

Ferroalloys.—Production of ferroalloys in Russia had fallen by about 50% from 1990 levels of o , with particularly sharp declines in the production of lightweight ferrroalloys such as ferrotitanium and ferrovanadium. Russia, however, was adequately supplying the countries of the FSU with lightweight ferroalloys because consumption of these ferroalloys also had fallen sharply.

Ferroalloys in the Russia were produced at specialized plants in Russia in Chelyabinsk, Dvurechensk, Kosaya Gora, Lipetsk, Novokuznetsk, Tula, and Serov. Russia produced about one third of the FSU's ferroalloys including about one-third of the FSU's ferrosilicon, more than 50% of its chrome alloys, and almost 15% of its manganese alloys. A number of ferroalloys including ferromolybdenum, ferrotungsten, and ferrovanadium were only produced in Russia. Russia was heavily dependent on imports of alloying material including manganese and chromite, which it imported mainly from other countries of the FSU. In 1995, the Russian ferrochrome industry, which had in previous years received almost all of its chromite raw material from Kazakstan, experienced extreme shortages of chromite when in the second half of 1995 the Japan Chrome Corporation, the new managers of the Kazakstan chromite industry, cut off shipments of chromite to Russia and instead directed their exports to world markets.

Gold.—According to The Russian Committee for Precious Metals and Stones (Roskomdragmet), in 1995, Russia produced 132.17 t of gold, of which 19.8 t was byproduct and secondary gold. Russia's independent prospecting artels mined 68.5 t of this total. Magadan Oblast and the Chukotka Peninsula, which had been the FSU's largest gold-producing region, producing between 120 to 130 t of gold in the late 1980's, in 1995, produced only slightly more than 24 t of gold, representing a 30% decrease in gold production compared with that of 1994. The policy of maintaining the exchange rate trading band for the ruble, it was claimed, was making gold mining unprofitable. All gold-mining and beneficiation enterprises in Magadan oblast reportedly operated at a loss in 1995, with the small enterprises and artels barely surviving.

In October 1995, the Chairman of the Russian Committee for Precious Metals and Stones (Roskomdragmet) stated that Russia's gold reserves were about 350 t with the majority of these reserves held by the Central Bank of Russia; Roskomdragmet also was holding a considerable amount. This reserve number reported in October by Roskomdragmet was 40 t higher than the number it reported in June 1995, indicating apparently that

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reserves were increasing.

The main producer of gold jewelry in Russia is the Yuvelierprom jewelry manufacturing and trading company. It produced 90% of all Russia's gold jewelry, 60% of its silver jewelry, and also cut and polished diamonds and made diamond jewelry. Jewelry consumption had fallen sharply in Russia since the breakup of the Soviet Union. It also had fallen sharply in the main export markets for Russian jewelry in the FSU. This fall in consumption continued in 1995 with jewelry markets in other FSU countries having practically disappeared.

Iron and Steel.—Production of crude steel in 1995 reportedly increased by more than 5% compared with that of 1994. Production of pig iron in 1995 also increased by about 10% compared with that of 1994. Approximately 60% of Russian steel output was exported in 1995. In 1995, more than 5 Mt of steel was toll produced in arrangements termed internal tolling whereby foreign firms purchased the raw materials for steelmaking in Russia and then shipped these raw materials to Russian steel mills to be toll smelted.

Foreign investment in the Russian steel sector has been quite limited despite Russia's entreaties for foreign investors to take advantage of the country's cheaper labor, underdeveloped domestic market, and large supply of steelmaking raw materials. Russia was trying to improve the attractiveness of investing in the steel sector by declaring tax holidays and exemptions from duties on imported equipment. The primary need was to modernize the steel industry. By modernizing its steel industry to produce higher quality steel, it is envisaged that Russia both would stimulate domestic demand and make Russian steel more saleable on world markets. A number of Western firms including Germany's Mannesman Demag AG and Thyssen AG, Austria's Voest-Alpine AG, Italy's Danieli SpA, and the United Kingdom's Davy International were supplying equipment to modernize Russia's steel industry.

Iron Ore.—In 1995, Russia reported a 7% increase in iron ore production compared with that of 1994. In 1995, Russian iron ore exports increased by 1.6% compared with that of 1994 to 14.25 Mt, of which 11.18 Mt went to countries outside the Commonwealth of Independent States (CIS). Production increases were reported at Russia's three major iron-ore-mining complexes, the Mikhailovka, Lebedi, and Stoilo, which are all in the Kursk Magnetic Anomaly (KMA).

Lead-zinc.—In 1995, production of lead, including secondary lead, reportedly fell by 6% compared with that of 1994. Russia reported producing 28,400 t of lead in 1994 including 15,700 t from concentrates and 12,700 t from scrap. Primary zinc metal production in 1995 reportedly increased by 21% compared with the 1994 level. In 1994, Russia reported producing 137,800 t of zinc from concentrates. Russia was both a lead and zinc importer and exporter, with imports in 1994 of 74,200 t of refined lead and 107,300 t of zinc metal and exports of 14,000 t of refined lead, 26,100 t of zinc in concentrate, and 88,100 t of zinc metal. All of Russia's lead and zinc imports came from the CIS, primarily Kazakstan and Uzbekistan. In 1995, Russia planned to export 82,000 t of zinc metal.

Russia's lead-zinc mining complexes include the Dalpolimetal complex in the Russian Far East, the Nerchinsk complex in the trans-Baikal region, the Salair and Altay complexes in Western Siberia in the Kemerovo and Altay regions respectively, and the Sadon complex in Severo-Ossetiya. There are a number of copper-zinc mining complexes in the Urals. A portion of the lead and zinc concentrates were sent to Kazakstan and Uzbekistan for metallurgical processing.

Most of Russia's lead-zinc deposits were being depleted, and increased production will have to come primarily from finding and developing new fields. A number of new fields were under development. These included the Ozernoye lead-zinc field in northern Buryatiya 140 kilometers north of the Trans-Siberian Railroad, the Goryevskoye lead-zinc deposit in the Krasnodar region of the North Caucasus, and several deposits in the Altay region. New metallurgical plants will have to be built and older ones expanded to process raw material from these new deposits.

Magnesium.—According to information presented at the International Magnesium Association conference in Yamaguchi, Japan, June 2-4, 1996 in a paper entitled "Magnesium Industry in Russia", by Pavel G. Detko and Adrey B. Kudlay, who are employed by the Solikamsk magnesium plant in Russia, in Russia, magnesium is produced at the Avisma titanium-magnesium plant and at the Solikamsk magnesium plant, both in the Urals. Magnesium production in Russia as well as the rest of the FSU, with one exception in Ukraine, is based on carnallite from the Verkhne Kamsk carnallite deposit in the Urals. Part of the magnesium produced is used in titanium sponge production and the other part sold as magnesium. There were five plants in the Soviet Union producing magnesium with two in Russia, two in Ukraine and one in Kazakstan. Peak magnesium production during the Soviet period was 160,000 t/yr with 65,000 t of this total for sale as magnesium and 95,000 t used for titanium sponge production. Russia had produced almost two-thirds of the magnesium for sale in the FSU, Ukraine more than 25%, with the remainder from Kazakstan.

Russia reportedly increased magnesium for sale production in 1995 by 5.9% compared with that of 1994. Production of magnesium alloys, however, dropped precipitously from 15,000 t in 1991 to 2,000 t in 1995 owing to the fall in consumption in the FSU.

At the Solikamsk plant, (Russia's oldest, brought on stream in 1936), primary magnesium output has remained at the 16,500 t/yr to 17,000 t/yr level for the past 15 years with future output expected to remain at this level. The plant also produces about 5,000 t/yr of secondary magnesium.

The Avisma titanium-magnesium plant was put on-

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stream in 1943 and is also supplied by carnallite from the Verkhne Kamsk deposit. Although magnesium output for sale at Avisma had fallen from 22,000 t/yr in the late 1980's to between 13,000 t/yr and 14,000 t/yr in 1993, by 1995, magnesium for sale output at Avisma had increased to 20,000 t.

In 1995, Russia remained a major magnesium exporter to world markets.

Nickel.—According to estimates of the International Nickel Study Group, in 1995, Russia produced 201,900 t of primary nickel compared with reported production of 180,900 t of primary nickel in 1994. Output from the Norilsk mining and metallurgical complex in East Siberia, Russia's major producer of nickel, reportedly increased by 11% in 1995 compared with that of 1994. Nickel exports in 1995 reportedly increased by 35.8% compared with that of 1994 to over 155,000 t.

In December 1995, Russia's Oneximbank acquired a 51% stake in the voting shares of the Norilsk enterprises through a Government loan for shares program. The Oneximbank received these shares from the Russian Government for a $170.1 million loan when the Russian Government did not repay the Oneximbank. The acquisition of these shares was being contested in court by Norilsk's management.

The Finnish mining company Outokumpu held a 50% share in two exploration companies exploring nickel reserves of the Lake Lovno deposit on the Kola Peninsula and of the Kivi-Yarvi deposit in Karelia. Although exploration at Lake Lovno has confirmed nickel reserves, reportedly it is not yet certain whether the quantity of reserves in these deposits would justify development.

Platinum Group Metals.—The increase in nickel production in 1995 resulted in an increase in output of platinum group metals, which are a byproduct of nickel production at Norilsk in East Siberia. With the increase in output there was an increase in exports. According to reported estimates by Johnson Matthey, 1995 platinum sales could reach 1.2 million troy ounces compared with 1.01 million troy ounces in 1994; palladium sales could reach 4 million troy ounces compared with 3.3 million troy ounces in 1994, and rhodium sales would remain at 80,000 troy ounces. Although some of these increases in sales came from increased production, it is probable that a large portion also came from stockpiled material.

Silver.—Silver was primarily produced either at gold-mining enterprises as a coproduct or as a byproduct of nonferrous ores. Russia had one major hard rock silver-mining operation, the Dukat Mine in Magadan Oblast in the Russian Far East, that produced silver and gold. The Dukat silver mine, which contains more than 60% of Russia's silver reserves, was experiencing serious financial difficulties in 1995. Discussions were occurring concerning the sale of the mine or its possible bankruptcy. In 1995, silver concentrates from Dukat were sent for smelting to Canada's Cominco Ltd. in British Columbia where they were processed to blister and then sent to Japan for refining. The Dukat Mine had planned to send 30,000 t of concentrate to Cominco in 1995, but sent only about 12,000 t. Cominco received an additional 1,500 t of silver concentrate for processing from the Karamken mining complex, also in Magadan Oblast.

Tin.—Tin mine production and tin consumption in Russia had fallen sharply since the breakup of the Soviet Union. Production of refined tin was estimated again to have decreased in 1995 to 9,500 t compared with 11,500 t in 1994 and 13,400 t in 1993. It is estimated that Russia toll refined about 500 t of tin in 1995, more than 1,000 t in 1994, and about 300 t in 1993. During the 1980's, the FSU imported on average 10,000 to 12,000 t/yr of pig tin for refining at Novosibirsk and about 1,500 t/yr of tin in concentrate. Tin imports ceased in 1991. Russia, in the 1990's, switched from being a net importer to being a net exporter of tin, exporting 4,000 t in 1993 and 7,500 t int 1994. Russia was planning to export 5,300 t in 1995.

Tin mining was centered in the Russian Far East in the Chita, Khabarovsk, Magadan, Maritime, and Yakut-Sakha regions. Russia's major tin smelter was at Novosibirsk in East Siberia. There was a smaller smelter at Ryazan that produced solders, babbets, and various tin products as well as tin. In 1995, 11 Russian tin mining and beneficiation plants had stopped producing, among which were the Pevek and Iultin. Only four complexes remained mining tin, the Deputatskiy in the Yakut-Sakha Republic, the Solnechnyy in Khabarovsk Kray, the Khrustalnyy in the Maritime region, and the Khingan complex in the Birobidzhan Jewish Autonomous Kray of Khaborvsk Kray. All the remaining operating complexes except Solnechnyy reported significantly reduced production. All of the tin mining complexes except Khrustalnyy reportedly had adequate reserves for several decades except Khrustalnyy that had reserves adequate for only 5 to 6 more years.

Titanium.—The Avisma titanium-magnesium complex, which is Russia's only producer of titanium sponge, reported that titanium sponge output in 1995 approximately doubled compared with that of 1994 to 39,000 t. Because of a large increase in demand for titanium dioxide, which in the FSU was practically all produced in Ukraine, Avisma was planning to establish a new division for titanium dioxide production.

Ukraine was the only supplier of titanium ore for the titanium industries of the FSU, which are located in Russia, Kazakstan, and Ukraine. Russia was striving to develop its own titanium ore deposits to eliminate its import dependence on Ukrainian raw material. It appears that Russia is interested in developing deposits that could be suitable for either metals or pigment production. Russia currently has no significant domestic titanium pigment production and wants to develop this capacity.

Tungsten.—Tungsten production in Russia recovered significantly in 1995, with production of tungsten concentrate repotedly increasing by 34.7% compared with that of 1994. Furthermore, Russia reportedly supplemented tungsten exports through the sale of large

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amounts of tungsten concentrate from the state reserve.

Russia's largest producer of tungsten, the Tyrnyauz tungsten and molybdenum complex in the Kabardino-Balkaria Republic in the North Caucasus, reportedly had proven commercial tungsten reserves of 374.1 Mt of ore in categories $A+B+C_1$, 264.1 Mt of which were suitable for underground mining and 110 Mt suitable for surface development.

Despite large reserves, the ore grades at Tyrnyauz were considerably lower than at foreign operations. Plans for 1995 and 1996 called for more selective mining of higher grade ores to increase profitability. Therefore, plans called for concentrating on developing these ores from underground mines and not engaging in open pit mining. Plans called for Tyrnyauz to extract 2.2 Mt of ore in 1995, which would be a fourfold drop in ore extraction. Concentrate production at Tyrnyauz was expected to remain at the previous year's level owing to the mining of higher grade ores. In 1996, plans called for mining ore with a tungsten content of 0.19% and a molybdenum content of 0.035%. All concentrate was shipped for processing to the Nalchik metallurgical plant, 80 km from Tyrnyauz.

A shutdown was reported from October 30 to yearend at the Primorye tungsten mining operation in the Primorye region of the Russian Far East owing to difficulties competing on the domestic market with another tungsten mining operation, the Lermontov tungsten mining complex, also from the Primorye region. Production costs for concentrate at the Primorye complex were reportedly 50% higher than for Lermontov. The Primorye complex reportedly at the time of shutdown had built up 1,700 t of surplus tungsten concentrate stocks. To improve its competitiveness, according to its management, the Primorye complex would require substantial investment.

Industrial Minerals

Cement.—In 1995, Russian cement production reportedly decreased by about 2% compared with that of 1994 after having decreased by about 20% per year between 1991 and 1993 and by more than 25% in 1994 compared with that of 1993. In the years following the break up of the Soviet Union, the Russian cement industry was affected by the fall in FSU consumption, the lack of investment funds, and the fact that cement prices were not increasing as rapidly as fuel and transport costs. This resulted in the shutdown of both production lines and plants. The improvement shown in 1995 was attributed to increased demand in the housing sector. The Russian cement industry was in need of modernization. Almost all Russian cement plants still use wet processing technology, and, because of lack of investment funds, worn out equipment has not been repaired or replaced. Although Russian cement can meet quality certifications for export, the absence of packing facilities that meet international standards has impeded exports. Privatization and deregulation is fairly far advanced with the industry almost totally deregulated since 1992 and now about 80% privatized. Shares in a number of Russian cement plants are trading on Russian exchanges and foreign investors are beginning to enter the Russian cement market.

Diamonds.—Russia's main diamond mining enterprise, Almazy Rossii-Sakha (ARS), which mines more than 98% of Russia's diamond output in the Yakut-Sakha Republic, is planning to increase diamond production by commissioning the first stage of a mining and beneficiation complex at the Yubeleyniy open pit and by developing the Botuobinskaya pipe.

De Beers Centenary AG had the right to market 95% of total Russian uncut production under a five year agreement due to expire at the end of 1995. Negotations had commenced with De Beers on the terms of a new agreement.

More than 95% of the production of Russia's diamond cutting industry was exported. ARS was encharged with controlling Russian transactions in rough diamonds. The trading firm Almazjuvelierexport was the only entity legally entitled to export cut diamonds and diamond jewelry.

Magnesite.—Russia's main production center for magnesite is the group of deposits comprising the Satka field in the southern Urals. Production of dead-burned magnesite is based on magnesite from Satka and also on brucite from the Kuldur brucite deposit in the Khabarovsk region near the Transsiberian railroad. Production of dead-burned magnesite occurred at three enterprises: the Magnesite Refractory Production (MRP) joint stock company with a capacity of almost 2 Mt/yr of dead burned magnesite, the Bogdanovich Refractory Production Association with a capacity of over 250,000 t/yr based on brucite, and the small Vnukovsky Refractory Plant in Odintsovo in Moscow Oblast. The magnesite industry has been affected by the decline in steel production. Also, the industry needs to raise the quality of its dead burned magnesite to be competitive on world markets and has to address environmental problems, particularly involving flue dust from rotary kilns at MRP. At MRP, plans call for installing a flotation plant to produce an upgraded magnesite concentrate for dead-burning to improve the quality of the product, and for constructing a briquetting plant to process dust and return it to the kilns to ease environmental problems.

Phosphate.—In 1995, apatite concentrate production in Russia is estimated to have increased by about 6% compared with that of 1994. More than 95% of Russia's phosphate production is in the form of apatite concentrate with an average P_2O_5 content of more than 35%. Almost all of the apatite production comes from the Khibiny apatite complex on the Kola Peninsula, but some apatite concentrate is produced by the Kovdor iron ore mining complex also on the Kola peninsula. Apatite concentrate production in 1995 at Kovdor reportedly decreased to 407,300 t from 446,600 t in 1994. About 20% of Russia's

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apatite concentrate production was exported with about 75% of these exports going to West European countries and the remainder to former Soviet bloc countries of East Europe.

Potash.—Russian potash production in 1995 is estimated to have increased by about 12% compared with that of 1994. Russian exports of potash also increased in 1995 to almost 2.2 Mt compared with 1.9 Mt in 1994.

This production increase reversed a steady decline in potash production that had been occurring since the breakup of the FSU. The decline was attributed in large measure to the economic effects of the transitional period that resulted in agricultural producers lacking funds to purchase potash and the Government being unable to provide credit for fertilizer purchases. Russian potash production is based on the exploitation of the Verkhne Kamsk deposit in the Ural Mountains by two enterprises, the Uralkaliy and Silvinit enterprises.

Salt.—Russian salt production increased by 25% in 1995 compared with that of 1994, with the country's salt production starting to increase after having fallen from 4.1 Mt in 1991 to 2.0 Mt in 1994. Capacity utilization at Russian salt mines had fallen from more than 90% in 1991 to less than 50% in 1995.

The majority of Russia's salt production occurred from mines in the Caspian basin. The fall in production was attributed to a lack of capital for maintaining mines and equipment. Although Russia's past salt consumption had reached a peak of 9.5 Mt/yr in the Soviet period, demand for salt had fallen sharply as Russian economic activity decreased. Russia traditionally imported a large percentage of its salt requirements from Ukraine and other FSU states, but imports too have fallen. A 1992 program designed to increase Russia's salt production to between 7 Mt/yr and 7.3 Mt/yr in 1997 had not been implemented.

Soda Ash.—Production of soda ash in 1995 reportedly increased by about 14% compared with 1994. Russia has five of the FSU's eight soda ash plants, with three of these five plants using a technology based on processing nepheline and the remaining two using the Solvay process. The total plant capacity for these five plants exceeds 4 Mt; nepheline-based plants account for 15% of the total capacity. The nepheline-based plants were constructed during the Soviet period when the Soviet Union developed its nepheline resources for its aluminum industry in order to not be dependent upon imported bauxite. Although processing nepheline into alumina is more expensive than processing bauxite, the country set self-sufficiency rather than cost as its priority. However, in the production of soda ash, the nepheline-based plants have an attractive feature of yielding almost no effluents. [For a more detailed description of the soda ash industry of the FSU and the use of the nepheline process, refer to a paper by C. Watts-Jones, Chem Systems Ltd. London, U.K. entitled "Former USSR Soda Ash, Production and Patterns of Demand in a Global Context", presented at the 12th Industrial Minerals Congress].

Mineral Fuels

Coal.—Russian coal production in 1995 decreased by more than 3% compared with that of 1994, with output falling 30% in the Moscow basin, 19% in the Urals fields, 13% in the Kansk-Achinsk basin, 8% in the Donets basin, and 2% in the Pechora basin. However, coal output increased by 14% in the Khakassia Republic, 4% in the Russian Far East, and 2% in the Chita region. Coal production remained at its 1994 level in the Kuznetsk basin, Russia's main coal-producing region. According to preliminary data, in 1995, Russia reported importing 19,430,400 t of hard coal, of which 18,402,000 t came from the CIS. Russian coal exports reportedly increased in 1995 by 22.6% compared with that of 1994 to 29.6 Mt with exports to countries outside the CIS comprising 21.1 Mt of the total.

Natural Gas.—In 1995, Russian natural gas production decreased by about 2% compared with 1994. Although production in most Russian mineral sectors fell sharply following the breakup of the Soviet Union, Russia was better able to maintain natural gas production, with production in 1995 having decreased only 7% from a high of 642.9 billion cubic meters (m^3) in 1991. Russian production of liquefied petroleum gas (LPG), however, had fallen sharply, decreasing from 8.02 Mt in 1991 to 4.95 Mt in 1995.

In 1995, Russia reported producing almost 8.5 Mt of unstable gas condensate, which includes LPG, natural gasoline, and condensate. The western Siberia oil and gas complex produces about 60% of Russia's condensate output. Western Siberian condensate reportedly is highly valued because it is sulfur and mercaptan free and contains 80% to 90% light hydrocarbons.

Russia's Gazprom concern, a joint-stock company controlling natural gas production, processing, and transportation, still maintained the monopoly control over the Russian gas sector exercised by the former U.S.S.R. Ministry of Natural Gas. Gazprom produces almost 95% of Russia's total natural gas production, with the remaining output coming from casing head gas from the oil sector.

West Siberia accounts for more than 90% of the country's natural gas output. In 1995, production in West Siberia decreased by 2% at Gazprom's fields, and there have been sharp decreases in the production of casing-head gas in West Siberia because of declining oil production. Decreased natural gas output was also reported in the Orenburg region in the Urals. However, natural gas production in 1995 increased in a number of Russia's other producing regions, including a 21% increase reported in the Astrakhan region, an 11% increase in the Sakhalin region, and a 2% increase in the Yakut-Sakha Republic.

Russia possesses more than 85% of the FSU's natural gas reserves, with reportedly 48 to 49 trillion m^3 of reserves in the A,B,C_1 categories deemed "proven" reserves of commercial grade. Total potential gas resources reportedly exceed 200 trillion m^3. Almost one-

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half of Russia's prospective area for natural gas development lies offshore on the Continental Shelf or in internal seas. Russia's proven natural gas reserves are heavily concentrated in one region, northern Tyumen Oblast in West Siberia, with 80% of the country's proven reserves.

Russia has continued to export natural gas to consumers in the other FSU countries, in the former East bloc, and in Western Europe. Russia reported exporting a total of 192.2 billion m^3 of natural gas in 1995, which was a 4.3% increase compared with that of 1994. Russia exported 121.9 billion m^3 outside the CIS, which was an 11.2% increase compared with that of 1994, and 70.3 billion m^3 to CIS countries.

Exports of natural gas to FSU countries had fallen since the breakup of the Soviet Union owing to both decreased economic activity in this region and to the inability of these countries to pay for imported gas. Reportedly total indebtedness to Gazprom from Ukraine, Belarus, Moldova, and the Baltic states for the first 9 months of 1995 totaled between 15 and 16 trillion rubles, which was about the same amount Gazprom was owed by domestic consumers in Russia. The price Russia had been charging the FSU countries was less than the world market price, but much more than under the former Soviet subsidized price structure. The FSU countries had been paying for Russian gas in either hard currency, rubles, or barter trade in goods and services.

Exports of natural gas during this period have also fallen to former bloc countries of East Europe, while natural gas exports have increased to West Europe. Russian exports of LPG to both the FSU and the rest of the world had fallen sharply from 2.1 Mt in 1995 to 850,000 t in 1995. This fall in exports for LPG coupled with the fall in domestic consumption was reportedly causing great financial hardship for the gas processing sector.

Oil Shale.—In 1995, Russia's producer of oil shale, the Lenigradslanets mining company, reportedly produced 2.3 Mt of oil shale. The company's main customer was the Baltic powerplant in Narva, Estonia.

Petroleum.—In 1995, production of oil and gas condensate decreased by about 3% compared with that of 1994, with production decreasing by 5% in Tyumen Oblast, West Siberia, which accounts for over 65% of Russia's total output. Production increases were reported in several regions, including a 30% increase in the Vologograd and Archangelsk regions, a 6% increase in Tatarstan, and a 3% increase in the Perm region. Joint ventures reportedly produced 17.8 Mt of oil in 1995, which was an increase over 1994 joint-venture production of 14.7 Mt. Refinery output from primary crude oil fell by 2% in 1995 compared with that of 1994 to 183 Mt, but the refineries were able to upgrade their product mix, producing more light petroleum products and lubricating oils while reducing output of boiler fuel.

Total Russian exports of crude oil were reported to be 110.9 Mt. Of total Russian crude oil exports, about 16% was exported to FSU countries and another 14% to former Soviet bloc countries of East Europe and Cuba.

In 1995, total Russian exports of petroleum products decreased by 6.3% compared with that of 1994 to about 45 Mt, of which more than 10% went to countries of the FSU and under 3% to former Soviet bloc countries of East Europe, Cuba, and Mongolia.

In 1995, the trend continued of increasing oil shipments to world markets outside the FSU as domestic and FSU consumers were often unable either to make timely payments or pay in hard currency for oil.

Uranium.—Russia had one uranium mining operation, the Priargusnkiy mining and chemicals association based in Krasnokamesnk in the Transbaikal region of Chita Oblast. It produced about 3,000 t/yr of uranium concentrate (U content) and planned to raise this amount to 4,500 t/yr. Priargunskiy reportedly was holding discussions with foreign firms to create a partnership to expand production. The Russian nuclear power industry reportedly needed about 7,000 t/yr of concentrate.

Reserves

Russia used the Soviet reserve classification system which was not the same as that used in the United States. According to the Soviet classification system, approved in 1982, deposits of all solid mineral materials are classified under two cross-imposed systems, one relating to the reliability of information on the quantity of material in place and the other relating to the economic viability of this material.

The classification system relating to the reliability of information on the quantity of material in place assigns each occurrence to one of seven categories—the reserve base categories A, B, C_1, and C_2, and the prognosticated resource categories P_1, P_2, and P_3.

According to the Soviet classification system, the reserves base for all solid mineral raw materials is divided into the explored or proven "razvedannyye"—$A+B+C_1$ categories--and the perspective "pespektivnyye"—C_2 category. The three prognostited resource categories, "prognoznyye resursy", correspond to the western term "undiscovered resources."

Under the other part of the cross-imposed system, the Soviets separated the four reserve base categories into one of two categories, "balansovyye" or "zabalansovyye." The former word literally translated means balance, indicating that materials so classified are economically suitable for exploitation. The other category "zabalansovyye," translates literally as beyond balance, implying that materials so classified are not regarded as economically suitable for present exploitation.

The "balansovye" material in categories A, B, C_1, and C_2 were considered economic reserves by the Soviets. However material regarded as economic reserves in these categories may not correspond to the western concept of economic reserves (i.e., material economically exploitable

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under present market prices with existing technology). Although only the "balansovye" material was considered an economic reserve, the Soviet system often referred to all materials in categories A, B, C_1, and Ç as reserves "zapasy".

Also, despite these definitions, in the FSU a number of other terms are used to describe reserves including industrial reserves and commercial reserves, with the meaning of these terms having to be interpreted in the context of their usage and the Soviet reserve classification system.

Mining and construction of mining enterprises and the appropriate capital investment were authorized in the U.S.S.R. on the basis of the economic "balansovyye" reserves in place in categories A + B + C_1, which had to be in prescribed ratios. The "balansovye" C_2 reserves provided a general perspective for the development of mining enterprises, but did not constitute a justification for project planning.

The four reserve base categories (A, B, C_1, and C_2) are based on data obtained from an exploration grid of prescribed density (or its equivalent) and on certain types of chemical and other tests conducted according to regulations. Density of the grid in each of these categories is different for different kinds of ore and for four different types of ore bodies.

Oil and gas reserves are classified according to a similar letter system using the A, B, C_1, and C_2 categories for the reserve base and the categories C_3, D_1, and D_2 for the prognosticated resources. Categories and the criteria for development are similar to those for other minerals except they are based on the specific characteristics of oil and gas deposits.

Although Russia occupies over three fourths of the territory of the FSU and has a large part of its proven mineral reserves, reserves, nevertheless were distributed across the FSU in an uneven manner whereby certain reserves were disproportionally concentrated in specific countries.

Regarding the distribution of reserves in the FSU, for nonferrous metals Russia reportedly possesses 77% of the FSU's bauxite, 53% of its copper, 34% of its lead, 48% of its zinc, 95% of its nickel, 91% of its tin, 40% of its tungsten, and 42% of its molybdenum. For ferrous metals, Russia possesses 60% of the iron ore reserves of the FSU, but only 2.2% of the chromite and 4.7% of the manganese reserves. The distribution of industrial minerals is also uneven. For example, Russia possesses 34% of the fluorspar reserves of the FSU, 58% of the graphite reserves, 69% of the potash reserves, and 46% of the table salt reserves. One of Russia's major areas of strength is its fuel reserves as Russia possesses 70% of the coal reserves as well as the majority of the oil and gas reserves of the FSU. Another major area of strength for Russia is its reserves of precious metals and stones, with Russia possessing large reserves of gold and silver and almost all the reserves in the FSU of platinum-group metals, diamonds, and rubies.

Despite large quantities of explored reserves, according to assessments of the Russian Committee for Geology and the Utilization of Natural Resources (Roskomnedr), between 30% to 70% of Russia's explored reserves of a wide range of minerals would not be economic to develop at current world prices using the mining methods from the Soviet period. According to Roskomnedr, Russia has to introduce state-of-the-art mining technologies such as heap leaching and solution mining to economically exploit many of these reserves.

The depth of reserves at mining enterprises averages 600 meters (m) for ferrous metals and 500 m for nonferrous metals. However, at a number of enterprises reserves are at a depth of more than 1,000 m and in the future may go as deep as 1,500 to 2,000 m. Already one-third of copper reserves; practically all cobalt and nickel reserves, a significant portion of lead and zinc reserves; and the majority of bauxite, high quality iron ore, and phosphate reserves are at a depth of more than 1,000 meters.

All of the countries of the FSU, including Russia, are now in need of methodologies to assess their mineral reserve data in terms of market economy criteria. The Soviet reserve classification system was not based on market economy production costs. which could not be determined using the Soviet system of central planning and fixed prices.

Although Russia has a number of world-class mineral deposits, owing to the development of its mineral industry under the Soviet central planning system that did not account for costs as would a market economy system, a significant percentage of developed deposits and processing facilities are now at a disadvantage as they try to compete for world markets. A representative of the Russian Metallurgy Committee stated that developed deposits in Russia compared to foreign deposits had an average metal content of lead-zinc that was 2.5 times lower; of tin, 2.3 times lower; of tungsten trioxide, 2.2 times lower; and of molybdenum, 2 times lower. A number of enterprises mining these low grade deposits were on the verge of bankruptcy with some already bankrupt. Many mining enterprises in order to survive were selectively mining their high-grade ore to the apparent detriment of their longer term future. In Addition to the problems of low-grade deposits, the level of geological prospecting in Russia had fallen by about 50% since 1990.

Infrastructure

Russia had a total of 154,000 km of rail lines, of which 67,300 km were only for servicing specific industries; 9,343,000 km of highway, of which 209,000 km is hard unpaved; more than 100,000 km of navigable inland waterways; about 48,000 km of crude oil pipelines and 15,000 km of product pipelines; and 140,000 km of natural gas pipelines.

Russia had the longest coastline of any country, with

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more than 15 seaports, including Arkhangelsk, Kaliningrad, Murmansk, Nakhodka, Novorossiysk, Vladivostok, and others and a large number of inland ports, including Astrakhan, Kazan, Khabarovsk, Krasnoyarsk, Kuybyshev, Moscow, Nizhniy-Novgorod, Rostov, and Volgograd. The greater portion of the seacoasts, however, is in sparsely populated or uninhabited regions along the Arctic Ocean. There are only a few good natural ports, and yearround access to the open seas is available only along the temperate coast in the extreme northwest.

Russia faces the problem of depleting older deposits in areas with developed infrastructure, while new deposits are in remote eastern and northern areas with severe climates and lack of infrastructure. Despite the statistics quoted on Russia's extensive transportation network, the country has no cross-country road system and practically no developed road networks in most of the northern and northeastern portions of the country. Furthermore, most of the rail network is concentrated in the western part of the country. There are only two rail lines transversing the eastern part of the country, the trans-Siberian and the Baikal Amur Mainline (BAM), with the BAM only partially operational and lacking connecting lines to areas of potential mineral development. Air transportation plays a vital role in passenger and industrial transport owing to the vast distances and the lack of other transport means.

In some eastern and northern parts of the country, the Russians relied on a combination of road, rail, river, and sea for minerals transport. Also, the Soviets developed a number of deposits depending primarily on air transport for freighting supplies and shipping minerals. For oil and gas, the Soviets had developed extensive pipeline networks that are now in great need of expensive maintenance and repair.

Outlook

The mining and metallurgical industries of Russia are in need of investment to maintain and modernize facilities, develop new mines and processing plants, and improve worker safety and pollution controls. During the Soviet period, the mining and metallurgical sector lacked the state-of-the-art technology and pollution controls of mineral industries in advanced market economy economies. Then the economic downturn following the breakup of the Soviet Union exacerbated this situation because there was a sharp curtailment of investment needed to maintain mines, processing plants, transport networks, and other infrastructure. Output in all sectors could be greatly increased if new investment funds were available to ensure needed upkeep and provide state-of-the-art technology. However, assessments would have to be made in terms of market economy criteria as to where to profitably direct such investment.

Merely to maintain its mineral base for ferrous and nonferrous metals, according to the Russian Metallurgy Committee, Russia needs to invest 26 trillion rubles (roughly $5.6 billion at the exchange rate at the time of this statement) in new mining capacity to maintain current output. Of this amount, only from one-fifth to one-half of the needed amount it was believed could be raised by the Russian mining industry. Therefore, the future development of Russia's mineral resources will depend on Russia ascertaining its reserves using market economy criteria and on Russia creating a political, financial, and legal climate for attracting long term investment in its mineral industry.

Many mineral products, although produced in large quantities, do not meet Western technical specifications. Many of these problems could be eliminated with investment in equipment and training of personnel. Besides being concerned with problems of meeting technical specifications, Western consumers are concerned with the ability of Russia's mineral industries to maintain quality control and to be able to supply materials on schedule. If problems of meeting technical standards, quality control, and reliability of supply were resolved, FSU mineral industries could become highly competitive in a large number of markets from which they are now excluded because of these problems.

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TABLE 1
RUSSIA: ESTIMATED PRODUCTION OF MINERAL COMMODITIES 1/ 2/

(Thousand metric tons unless otherwise specified)

Commodity		1992	1993	1994	1995
METALS					
Aluminum:					
Ore and concentrate:					
Bauxite, 26% to 57% alumina		4,580 2/	4,260 2/	3,000	3,100
Nepheline concentrate, 25% to 30%		1,500	1,390 2/	1,300	1,400
Alumina		2,718 2/	2,500	2,254 2/	2,600
Metal, smelter: primary 2/		2,730	2,820	2,669	2,722
Antimony, mine output, SB content	tons	10,000	8,000	7,000	7,000
Arsenic, white	do.	2,500	2,000	1,500	1,500
Beryllium, beryl, cobbed, 10% to 20% BeO	do.	1,100	800	800	800
Bismuth, mine output, Bi content	do.	5	4	4	5
Cadmium metal, smelter	do.	800	700	600	725
Chromium. chrome ore, marketable 2/	do.	121,000	121,000	151,400	107,700
Cobalt:					
Mine output, recoverable Co content	do.	4,000	3,300	3,900	4,000
Metal, refinery 2/	do.	4,100	3,700	4,340	4,450
Copper:					
Ore, Cu content, recoverable 2/	do	698,500	583,600	573,300	640,000
Metal					
Blister:					
Primary 2/	do	651,000	533,700	514,300	512,000
Secondary	do	10,000	10,000	10,000	20,000
Refined					
Primary 2/	do	522,000	486,200	501,800	575,000
Secondary	do	50,000	40,000	40,000	40,000
Gold, mine output, Au content 2/	kilograms	146,000	149,500	146,600	132,170
Iron and steel:					
Iron ore, 55% to 63% Fe 2/		82,100	76,100	73,300	78,300
Metal:					
Pig iron for steelmaking 2/		46,100	40,900	36,100	39,800
Ferromanganese		200	150	125	125
Electric furnace ferroalloys		1,100	850	800	650
Crude steel 2/		67,000	58,300	48,800	51,300
Finished rolled steel 2/		46,800	42,700	35,900	39,100
Steel pipes 2/		8,100	5,800	3,600	3,700
Lead:					
Mine output, recoverable Pb content	tons	22,000	19,500	17,000	16,000
Metal, smelter:					
Primary	do.	18,000	17,500	15,700 2/.	15,000
Secondary	do,	14,500	14,100	12,700 2/	11,500
Magnesium metal, primary	do.	40,000	30,000	35,400 2/	37,500 2/
Mercury metal, including secondary	tons	70	60	50	50
Molybdenum	do.	10,800	10,300	7,700	8,800
Nickel:					
Mine output, recoverable Ni content 2/	do.	280,000	244,000	240,000	251,000
Nickel, products 2/	do.	245,000	184,000	180,900	201,900
Platinum-group metals:					
Platinum	do.	28	20	15	18
Palladium	do.	70	50	40	48
Others	do.	6	4	3	4
Silver metal including secondary	do.	800	700	700	700
Tin:					
Mine output, recoverable Sn content	do.	16,000	14,000	12,000	10,000
Metal, smelter:					
Primary 2/	do.	15,200	13,400	11,500	9,500
Secondary	do.	1,500	1,500	1,000	1,000
Total	do.	16,700	14,400	12,500	10,500
Titanium, metal	do.	25,000	17,000	19,500	39,000 2/
Tungsten concentrate, W content	do.	13,000	10,200	5,200	7,000
Vanadium metal	do.	11,000	10,000	10,000	10,000

See footnotes at end of table.

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TABLE 1--Continued
RUSSIA: ESTIMATED PRODUCTION OF MINERAL COMMODITIES 1/ 2/

(Thousand metric tons unless otherwise specified)

Commodity		1992	1993	1994	1995
METALS--Continued					
Zinc:					
Mine output, recoverable Zn content	tons	160,000	150,000	145,000	130,000
Metal:					
Primary	do	185,000	200,000	137,800 2/	167,000
Secondary	do	60,000	60,000	50,000	50,000
INDUSTRIAL MINERALS					
Asbestos, grades I-VI		1,300	870 2/	615 2/	600
Barite		NA	NA	NA	NA
Cement, hydraulic 2/		61,700	49,900	37,200	36,400
Clays: Kaolin including china clay		NA	NA	NA	NA
Corundum, natural		NA	NA	NA	NA
Diamond:					
Gem	thousand carats	9,000	8,000	8,600	9,000
Industrial	do.	9,000	8,000	8,600	9,000
Total		18,000	16,000	17,200	18,000
Diatomite		NA	NA	NA	NA
Feldspar		100	70	50	50
Fluorspar					
Fluorspar, concentrate 55% to 96.4% CaF_2		100	70	50	50
Graphite		15	10	8	8
Gypsum		1,800	1,500	1,200	1,200
Lime, dead-burned		NA	NA	NA	NA
Lithium minerals, not further specified		NA	NA	NA	NA
Magnesite, marketable product		1,100	800	700	700
Mica		150	129 2/	100	100
Nitrogen, N content of ammonia		9,000	8,000	7,500	8,000
Phosphate rock:					
Apatite, concentrate, 37% to 39.6% P_2O_5		11,000	9,000	8,000	8,500
Sedimentary rock, 19% to 30% P_2O_5		500	400	300	300
Total		11,500	9,400	8,300	8,800
Potash, K_2O equivalent 2/		3,470	2,628	2,498	2,800
Pyrite, gross weight		NA	NA	NA	NA
Salt, all types 2/		3,600	2,200 2/	2,000	2,500
Sodium compounds, n.e.s., carbonate 2/		2,679	1,992	1,585	1,800
Sulfur:					
Native		100	100	80	80
Byproducts:					
Of metallurgy		250	200	150	150
Of natural gas		1,800	1,700	1,600	1,500
Total		2,150	2,000	1,830	1,730
Sulfuric acid 2/		9,700	8,200	6,300	6,900
Talc		150,000	132,000 2/	100,000	100,000
Vermiculite		60	50	40	40
MINERAL FUELS AND RELATED MATERIALS					
Coal:					
Bituminous		210,000	200,000	170,000	160,000
Lignite and brown coal		127,000	106,000	102,000	102,000
Total 2/ 3/		337,000	306,000	272,000	262,000
Coke, 6% moisture content 2/		31,000	27,600	25,400	27,600
Gas, natural, marketed, as reported 2/	million cubic meters	641,000	618,000	607,000	595,000
Oil shale 2/		3,800	3,300	3,300	2,300
Peat, fuel use		7,800	2,500	2,900	2,900

See footnotes at end of table.

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TABLE 1--Continued
RUSSIA: ESTIMATED PRODUCTION OF MINERAL COMMODITIES 1/ 2/

(Thousand metric tons unless otherwise specified)

Commodity		1992	1993	1994	1995
MINERAL FUELS AND RELATED MATERIALS--Continued					
Petroleum:					
Crude:					
As reported, gravimetric units 2/		399,000	354,000	318,000	307,000
Converted, volumetric units	thousand 42-gallon barrels	2,900,000	2,600,000	2,300,000	2,250,000
Refinery products 2/ 4/		256,000	223,000	186,000	183,000
Uranium, U content		3,000	3,000	3,000	3,000

NA Not available.
1/ Table includes data available through Sept. `13, 1996
2/ Reported data.
3/ Run-of-mine coal.
4/ Not distributed by type and therefore not suitable for conversion to volumetric units. Data include all energy and nonenergy products but exclude losses.

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TABLE 2
RUSSIA: STRUCTURE OF THE MINERAL INDUSTRY FOR 1995

(Metric tons unless otherwise specified)

Commodity	Major operating facilities	Location	Annual capacity e/
Alumina	Achinsk	Achinsk in East Siberia	900,000.
Do.	Bogoslovsk	Urals	1,050,000.
Do.	Boksitogorsk	European north	200,000.
Do.	Nadvoitsy	Nadvoitsy in Karelia	266,000.
Do.	Uralsk	Kamensk region	536,000.
Do.	Volkhov	Volkhov, east of St. Petersburg	45,000.
Aluminum, primary	Smelters:		
Do.	Volkhov	do.	20,000.
Do.	Uralsk	Kamensk	70,000.
Do.	Bogoslovsk	Krasnoturinsk	162,000.
Do.	Novokuznetsk	Novokuznetsk	284,000.
Do.	Kandalaksha	Kola Peninsula	62,500.
Do.	Nadvoitsy	Nadvoitsy in Karelia	68,000..
Do.	Volgograd	Volgograd	168,000.
Do.	Irkutsk	Sherekov, near Irkutsk	262,000.
Do.	Krasnoyarsk	Krasnoyarsk	755,000.
Do.	Bratsk	Bratsk	843,800.
Do.	Sayansk	Sayanogorsk	274,000.
Apatite, concentrate	Khibiny apatit association	Kola Peninsula	15,000,000.
Do.	Kovdor iron ore mining association	do.	700,000.
Asbestos	Kiyembay	Orenburg Oblast	500,000.
Do.	Tuvaasbest	Tuva Republic	250,000.
Do.	Uralasbest	Central Urals	1,100,000.
Bauxite	North-Urals mining company	Severouralsk region	NA.
Do.	South-Urals mining company	South Urals region	NA.
Do.	Severnaya Onega mine	Northwest region	800,000.
Boron	Bor Association	Maritime region	140,000 (boric acid).
Do.	Amur River complex	Far East	8,000 (boric acid).
Do.	Alga River Chemical Complex	do.	12,000 (boric acid).
Chromite	Saranov complex	Saranov	200,000.
Coal	Basins:		
Do.	Donets (east)	Rostov Oblast	30,000,000.
Do.	Kansk Achinsk	East Siberia	50,000,000.
Do.	Kuznetsk	West Siberia	160,000,000.
Do.	Moscow	Moscow region	15,000,000.
Do.	Neryungri	Yakut-Sakha Republic	15,000,000.
Do.	Pechora	Komi Republic	30,000,000.
Do.	South Yakutia	Yakut-Sakha Republic	17,000,000.
Cobalt	Norilsk Nikel	Norilsk, Kola Peninsula	4,000.
Do.	Rezh, Ufaleynikel,	Southern Urals	4,000 (total
Do.	Yuzhuralnikel enterprises		southern Urals).
Do.	Tuva Cobalt	Khovu-Aksy in Tuva Republic	NA.
Copper, mining and beneficiation complexes (Cu content of concentrates)	Buribai Enterprise	Buribai region	5,000.
Do.	Gai Complex	Gai region	40,000.
Do.	Kirovgrad Complex	Kirovgrad region	12,000.
Do.	Krasnouralsk Complex	Krasnouralsk region	12,000.
Do.	Norilsk Complex	Norilsk region	400,000.
Do.	Sredneuralsk Complex	Ekatrinenburg region	12,000.
Do.	Uchali Complex	Uchali region	40,000.
Do.	Urap Complex	Stavropol region	7,000.
Copper, metal (smelting and refining complexes)	Kirovgrad (smelting)	Kirovgrad	150,000.
Do.	Krasnouralsk (smelting)	Krasnouralsk	60,000.
Do.	Kyshtym (refining)	Kyshtym	70000.
Do	Mednogorsk (smelting)	Mednogorsk	40,000.
Do.	Norilsk (smelting and refining)	Norilsk	500,000.
Do.	Pyshma (refining)	Pyshma	350,000.
Do.	Severonikel (smelting)	Monchegorsk	20,000.
Do.	Sredneuralsk (smelting)	Revda	140,000.

See footnotes at end of table.

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TABLE 2--Continued
RUSSIA: STRUCTURE OF THE MINERAL INDUSTRY FOR 1995

(Metric tons unless otherwise specified)

Commodity	Major operating facilities	Location	Annual capacity e/
Diamonds thousand carats	Almazy Rossii-Sakha ssociation	Aykhal, Mirnyy, Udachnaya areas of Yakut-Sakha republic	10,000 gem, 10,000 industrial.
Feldspar	Deposits:		
Do.	Lupikko	Karelia	NA.
Do.	Kheto-Lanbino	do.	NA.
Ferroalloys	Kosaya Gora Iron Works	Kosaya Gora	200,000.
Do.	Kuznetsk ferroallloy plant	Novokuznetsk	400,000.
Do.	Lipetsk Iron and steel works	Lipetsk	NA.
Do.	Serov ferroalloy plant	Serov	NA.
Do.	Tulachermet Scientific and Industrial Associati	Tula	NA.
Do.	Chelyabinsk Electrometallurgical plant	Chelyabinsk	350,000.
Do.	Chusovoy Iron and steel plant	Chusovoy	NA.
Do.	Klyuchevsk ferroalloy plant	Dvurechinsk	160,000.
Fluorspar	Mining and beneficiation complexes:		
Do.	Abagaytuy	trans-Baikal	NA.
Do.	Kalanguy	do.	NA.
Do.	Kyakhtinsky	do.	NA.
Do.	Usugli	do.	NA.
Do.	Yaroslavsky	Far East	NA.
Gold kilograms	Gold mining regions:		200,000 (total gold).
Do.	Yakut-Sakha	Yakut-Sakha Republic	
Do.	Buryat	Buryat Republic	
Do.	Magadan	Magadan oblast	
Do.	Krasnoyarsk	Krasnoyarsk region	
Do.	Maritime	Maritime region	
Do.	Tuva	Tuva Republic	
Iron ore	Mining areas:		
Do.	Kursk Magnetic Anomaly (KMA) containing following enterprises:		50,000,000 (total KMA).
Do.	Mikhailovka	Zheleznogorsk	
Do.	Lebedi	Gubkin	
Do.	Stoilo	do.	
Do.	Northwest containing following enterprises:		22,000,000 (total Northwest).
Do.	Olenogorsk	Olenogorsk	
Do.	Kostomuksha	Kostomuksha	
Do.	Kovdor	Kola Peninsula	
Do.	Siberia (east) containing the following mining enterprises:		18,000,000 (total Siberia east and west).
Do.	Korshunovo	Zheleznogorsk	
Do.	Rudnogorsk	Rudnogorsk	
Do.	Siberia (west) including the following mining enterprises:		
Do.	Abakan	Abaza	
Do.	Sheregesh	Sheregesh	
Do.	Tashtagol	Tashtagol	
Do.	Teya	Vershina Tei	
Do.	Urals containing following mining enterprises:		22,000,000 (total Urals).
Do.	Akkermanovka	Novotroitsk	
Do.	Bakal	Bakal	
Do.	Goroblagodat	Kushva	
Do.	Kachkanar	Kachkanar	
Do.	Magnitogorsk	Magnitogorsk	
Do.	Peshchanka	Rudnichny	
Lead-zinc (recoverable metal content of ore)	Mining complexes:		
Do.	Altay mining and beneficiation complex	Altay mountains region, South Siberia	2,000 lead, 1,000 zinc.
Do.	Dalpolymetal mining and beneficiation comp	Maritime region	20,000 lead, 25,000 zinc.
Do.	Nerchinsk polymetallic complex	Chita Oblast	7,000 lead, 12,500 zinc.
Do.	Sadon lead-zinc complex	Severo-Ossetiya	5,000 lead, 14,000 zinc.
Do.	Salair mining and beneficiation complex	Kemerovo Oblast	2,000 lead, 10,500 zinc.

See footnotes at end of table.

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TABLE 2--Continued
RUSSIA: STRUCTURE OF THE MINERAL INDUSTRY FOR 1994

(Metric tons unless otherwise specified)

Commodity	Major operating facilities	Location	Annual capacity e/
Lead, metal	Dalpolymetal lead smelter	Rudnaya in the Maritime district	20,000.
Do.	Elektrozinc lead smelter	Vladikavkaz in North Caucasus	30,000.
Magnesite	Satka deposit	Chelyabinsk Oblast	3,800,000.
Magnesium, metal (for sale)	Avisma plant	Berezniki	22,000.
Do.	Solikamsk plant	Solikamsk	21,500.
Mica	Mining complexes:		
Do.	Aldan	Yakut-Sakha Republic	NA.
Do.	Karel	Karelia	NA.
Do.	Kovdor	Kola Peninsula	NA.
Do.	Mam	Irkutsk complex	NA.
Molybdenum, mining enteprise	Dzhida tungsten-molybdenum mine	West trans-Baikal	NA.
Do.	Sorsk molybdenum mining enterprise	Sorsk region	NA.
Do.	Tyrny-Auz tungsten-molybdenum mining enterprise	North Caucasus	NA.
Do.	Shakhtaminskoye molybdenum mining enterprise	Chita Oblast	NA.
Natural gas billion cubic meters	Regions:		
Do.	Komi Republic	Komi Republic	8.0..
Do.	Norilsk area	Norilsk area	5.5..
Do.	North Caucasus	North Caucasus	6.0..
Do.	Sakhalin	Far East	2.0..
Do.	Tomsk Oblast	West Siberia	0.5..
Do.	Tyumen Oblast including:	do.	575.
Do.	Medvezhye field	do.	75..
Do.	Urengoi field	do.	300..
Do.	Vyrngapur field	do.	17..
Do.	Yamburg field	do.	170..
Do.	Urals	Urals	45..
Do.	Volga	Volga region	6..
Do.	Yakut-Sakha	Yakut-Sakha Republic	1.5..
Nepheline syenite	Apatite complex	Kola Peninsula	1,500,000.
Do.	Kiya-Shaltyr mine	Goryachegorsk region, east Siberia	NA.
Nickel, mining enterprise (Ni in ore)	Norilsk Nickel association	Norilsk region and Kola Peninsula	300,000.
Do.	Yuzhuralnikel company	Southern Urals	20,000 total southern Urals).
Do	Ufaleynikel company	do.	
Nickel, metal (smelting and refining complexes)	Norilsk Nikel (smelting and refining)	Norilsk	160,000 (smelting), 100,000 (refining).
Do.	do.	Pechenga	50,000 (smelting).
Do.	do.	Monchegorsk	50,000 (smelting), 140,000 (refining).
Do.	Rezh, Ufaleynikel, Yuzhuralnikel enterprises	Southern Urals	65,000 (total, nickel products and nickel in ferronickel).
Oil shale	Leningradslanets association	Slantsy region	5,000.000.
Petroleum	Producing regions:		
Do.	European Russia:		
Do.	Astrakhan	Northern Caspian Sea Basin	700,000.
Do.	Bashkortostan	Urals	28,000,000.
Do.	Checheno-Ingush Republic	Southern Caucasus	4,500,000.
Do.	Dagestan	North Caucasus	700,000.
Do.	Kaliningrad Oblast	Baltic coast	1,800,000.
Do.	Komi Republic	Northwest	15,000,000.
Do.	Krasnodar Kray	North Caucasus	2,000,000.
Do.	Orenburg Oblast	Urals	13,000,000.
Do.	Perm Oblast	do.	12,000,000.
Do.	Samara	Volga region	16,000,000.
Do.	Saratov Oblast	do.	1,500,000.
Do.	Stavropol Kray	North Caucasus	2,000,000.
Do.	Tatarstan	Volga region	40,000,000.
Do.	Udmurt Republic	Urals	9,000,000.
Do.	East Siberia: Tomsk Oblast	Tomsk Oblast	11,000,000.

See footnotes at end of table.

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TABLE 2--Continued
RUSSIA: STRUCTURE OF THE MINERAL INDUSTRY FOR 1995

(Metric tons unless otherwise specified)

Commodity	Major operating facilities	Location	Annual capacity e/
Petroleum--Continued:			
Do.	West Siberia:		
Do.	Tyumen Oblast:	Tyumen Oblast	300,000,000.
Do.	Kogolym field	do.	34,000,000.
Do.	Krasnoleninskiy field	do.	12,000,000.
Do.	Langepas field	do.	30,000,000.
Do.	Megion field	do.	18,000,000.
Do.	Nizhnevartovsk field	do.	70,000,000.
Do.	Noyabrsk field	do.	37,000,000.
Do.	Purneftegaz field	do.	12,000,000.
Do.	Surgut field	do.	48,000,000.
Do.	Uray field	do.	8,000,000.
Do.	Varegan field	do.	10,000,000.
Do.	Sakhalin Island	Sakhalin Island	2,500,000.
Phosphate rock	Khibiny Apatit association	Kola Peninsula	20,000,000 (apatite concentrate).
Do.	Kovdor iron ore mining complex	do.	700,000 (apatite concentrate).
Do.	Kingisepp complex	Leningrad Oblast	NA.
Do.	Lopatino, Yegorevsk deposits	Moscow Oblast	NA.
Do.	Polpinskoye deposit	Bryansk Oblast	NA.
Do.	Verkhnekamsk deposit	Urals	NA.
Platinum-group metals:			130 (total metal).
Ore	Norilsk Nikel association	Norilsk region	
Metals	Krasnoyarsk refinery of Norilsk Nikel association	Krasnoyarsk	
Potash, K_2O	Uralkaliy	Verkhne Kamsk deposit	3,000,000.
Do.	Silvinit	Solikamsk-Berezniki region of Urals	2,000,000.
Silver	Dukat mine	Magadan oblast	1,000 (total silver).
	Coproduct and byproduct of gold and nonferrous metals mining		
Soda ash	Achinsk plant	East Siberia	595.
Do.	Berezniki plant	Urals	1,080.
Do.	Pikalevo plant	Leningrad Oblast	200.
Do	Sterlitamak plant	Sterlitamak	2,135.
Do	Volkhov plant	Leningrad Oblast	20.
Steel, crude	Amurstal	Komsomolsk na Amur	1,600,000.
Do.	Asha	Asha	450,000.
Do.	Beloretsk	Bashkir Republic	380,000.
Do.	Chelyabinsk	Chelyabinsk	7,000,000.
Do.	Cherepovets	Cherepovets	14,000,000.
Do.	Chusovoy	Chusovoy	570,000.
Do.	Elektrostal	Moscow	314,000.
Do.	Gorky	Nizhniy-Novgorod	78,000.
Do.	Guryevsk	Guryevsk	160,000.
Do.	Karaganda	Karaganda	6,300,000.
Do.	Kuznetsk	Novokuznetsk	4,700,000.
Do.	Lipetsk	Lipetsk	9,900,000.
Do.	Lysva	Lysva	350,000.
Do.	Magnitogorsk	Magnitogorsk	16,200,000.
Do.	Nizhniy Tagil	Nizhniy Tagil	8,000,000.
Do.	Nizhniy Sergi	Nizhniy Sergi	300,000.
Do.	Novosibirsk	Novosibirsk	1,100,000.
Do.	Omutninsk	Omutninsk	210,000.
Do.	Orsko-Khalilovo	Novotroitsk in Orenburg Oblast	4,600,000.
Do.	Oskol Electric Steel	Stary Oskol	1,450,000.
Do.	Petrovsk-Zabaikalskiy	Petrovsk-Zabaikalskiy	426,000.
Do.	Revda	Revda	281,000.
Do.	Salda	Sverdlovsk Oblast	1,900.
Do.	Serov A.K.	Serov	1,000,000.

See footnotes at end of table.

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TABLE 2--Continued
RUSSIA: STRUCTURE OF THE MINERAL INDUSTRY FOR 1995

(Metric tons unless otherwise specified)

Commodity	Major operating facilities	Location	Annual capacity e/
Steel--Continued:			
Do.	Serp i Molot	Moscow	70,000.
Do.	Severskiy	Polevskoy in Sverdlovsk Oblast	825,000.
Do.	Sibelektrostal	Krasnoyarsk	110,000.
Do.	Sulin	Sulin	280,000.
Do.	Taganrog	Taganrog	925,000.
Do.	Tulachermet-Scientific and Industrial Associati	Tula	18,400.
Do.	Verkh-Isetskiy	Ekatrinenburg	132,000.
Do.	Volgograd	Volgograd	2,000,000.
Do.	Vyksa	Vyksa	540,000.
Do.	West Siberian	Novokuznetsk	6,900,000.
Do.	Zlatoust	Zlatoust in Chelyabinsk Oblast	1,200,000.
Talc	Deposits:		
Do.	Onotsk	Irkutsk Oblast	NA.
Do.	Kirgiteysk	Krasnoyarsk Kray	NA.
Do.	Miass	Chelyabinsk Oblast	NA.
Do.	Shabrovsk	Sverdlovsk Oblast	NA.
Tin, mining and beneficiation complexes	Khingan	Khabarovsk Kray	NA.
Do.	Solnechnyy	do.	NA.
Do.	Iultin	Magadan Oblast	NA.
Do.	Khrustalnyy	Maritime region	NA.
Do.	Deputatskiy	Yakut-Sakha Republic	NA.
Do	Pevek	Magadan oblast	NA.
Tin, smelters	Novosibirsk	Novosibirsk	NA.
Do.	Podolsk	Podolsk	NA.
Do.	Ryazan	Ryazan	NA.
Titanium, metal	Berezniki plant	Berezniki	40,000.
Do.	Moscow plant	Moscow	NA.
Do.	Podolsk plant	Podolsk	NA.
Tungsten, mining and beneficiation com lexes (W content of concentrates)	Antonovogorsk p	East Transbaikal	NA.
Do.	Balkan	Urals, northeast of Magnitogorsk	NA.
Do.	Belukha	East trans-Baikal	NA,
Do.	Bom-Gorkhom	West trans-Baikal	NA.
Do.	Dzhida	do.	NA.
Do.	Iultin	Magadan Oblast	NA.
Do	Lermontov	Maritime region	NA.
Do.	Solnechnyy	Southern Khabarovsk region	NA.
Do.	Tyrnyauz	North Caucasus	NA.
Do.	Primorye	Maritime region	NA.
Tungsten, metal	Nalchik plant	Caucasus	NA.
Uranium, U content	Priargunskiy mining and chemical enterprise	Krasnokamensk	3,000.
Vanadium, ore	Kachkanar iron ore mining complex	Urals	NA.
Vanadium, metallurgical processing facilities	Chusovoy plant	do.	17,000 (total metal).
Do.	Nizhniy Tagil plant	do.	
Zinc (nonassociated with lead), metal content of ore	Bashkir copper-zinc complex	Sibai in southern Urals	5,000.
Do.	Buribai copper-zinc mining complex	Buribai in southern Urals	1,500.
Do.	Gai copper-zinc mining and beneficiation comp	Gai in Southern Urals	25,000.
Do.	Kirovgrad copper enterprise	Kirovgrad in central Urals	1,200.
Do.	Sredneuralsk copper complex	Revda in central Urals	5,000.
Do.	Uchali copper-zinc mining and beneficiation complex	Uchali in southern Urals	90,000.
Zinc, metal	Chelyabinsk electrolytic zinc plant	Chelyabinsk	190,000.
Do.	Elektrozink plant	Vladikavkaz in North Caucasus	100,000.

e/ Estimated. NA Not available.

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THE MINERAL INDUSTRY OF

SERBIA AND MONTENEGRO

By Walter G. Steblez

In 1995, the economy of Serbia and Montenegro remained stagnant because of the international trade embargo established against it, stemming from the continuing military conflict in Bosnia and Herzegovina, and the general political instability in the former Yugoslav region. The country, with significant European capacities to produce refined aluminum, copper, lead, silver, and zinc, however, did appear to arrest the steep economic decline that was reported for 1993 (a 30% decline in GDP and more than a 35% decline in industrial output), during the 1994-95 period. According to the Federal Statistical Office of Serbia and Montenegro, the index of the physical volume of industrial output for the first 10 months of 1995 showed an increase of 6% compared with the same period in 1994. On the other hand, the country's aggregated mining and quarrying sector (covering the extraction of metallic and nonmetallic ores, quarrying products, coal, natural gas, and petroleum) declined by 17% compared with the same period in 1994.[1] The steep decline of output for this sector occurred largely because of the sharp drop in production of the iron ore mining and non metallic mineral ore mining industries, which registered declines of 47% and 21%, respectively, during the period from January to October 1995, compared with same period in 1994.[2] However, in the energy sector, output, in terms of physical volume, increased in coal mining by 6% and by 4% and 5%, respectively, in crude petroleum and natural gas extraction and refinery products production. The metals sectors also showed recovery in 1995. Iron and steel production increased by 43% compared with that of 1994 and that of smelting, refining and alloying of nonferrous metals increased by 9%. In the sphere of industrial minerals, the manufacture of nonmetallic mineral products increased by 11% during the 10-month period in 1995, compared with that of 1994.

The Government of Serbia and Montenegro continued to maintain the operation, to the extent possible, of the country's heavy industries, including those in the minerals sector, to ensure the availability of needed raw materials and equipment to the economy and to prevent potentially large-scale social unrest from taking place because of rapid industrial closures and bankruptcies. The principal activities of the Government from 1991 to 1995 involved international political issues related to the civil war that occurred in the former Yugoslavia. The usual efforts and programs of the Government, dealing with long-term economic reform and environmental protection and reclamation issues, were subordinated to the needs of a virtual war economy. The civil war, fought from 1991 through late 1995 in the former Yugoslavia, had dislocated routine domestic and foreign commerce because of the international embargo as well as the physical destruction of commercial and residential properties in large areas of Bosnia and Hezegovina and, to a lesser extent, Croatia. Without access to former domestic customers in the other republics of the former Yugoslavia, nor to international markets, large stockpiles of industrial goods reportedly accrued during the year, which necessitated sporadic as well as long-term closures of the country's production facilities during the year. With the agreements signed in September, 1995, to cease fire and to create peace in the region, known as the Dayton Peace Accords, most international economic sanctions were removed or put into abeyance, which should have a positive economic impact in 1996 and subsequent years not only within Serbia and Montenegro, but in the region as a whole.

Because of the conflicts that took place on the territory of the former Yugoslavia, little consistent information was made available about industry-generated environmental pollution or the status of environmental remediation. On the other hand, it has been reasonable to categorize the environmental situation in Serbia and Montenegro as being similar to that of other former centrally planned economy countries where environmental protection issues had a much lower status and level of concern in past years than in Western European market economy countries. Significant soil, water, and atmospheric contamination had been caused by the country's heavy industry, including mining and other minerals industry branches.[3] The use of low grades of coal and lignite at the country's industrial and electric-power generating facilities has raised the emission of sulfur dioxide (SO_2) to levels that reportedly were twice that in Western Europe. Concentrations of both SO_2 and NO_x had been consistently far in excess of safety guidelines set by the World Health Organization. Uncontained emissions from the country's nonferrous metals processing plants and smelters also contributed to acid rain, which has damaged many outlying forested areas.

Because of the civil war and associated international economic embargo of Serbia and Montenegro, funds necessary for even routine maintenance of tailings ponds

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and hazardous waste dumps were no longer available and the likelihood of a widespread ecological disaster has been increased significantly.

Serbia and Montenegro continued to curtail the production of various mineral commodities and durable goods, albeit to a lesser degree than in 1993-94. Compared with the sharp decline in industrial output registered in 1993, industrial performance in 1995 showed some marked improvement. However, recovery to production levels of 1991 may not be achieved in the near term owing to a adjustment period to new regional and world market realities. The Government's post-embargo policies aimed at establishing a market economy within the country also could serve as a restraint on output growth in the mineral industry. (*See table 1.*) Table 2 lists the administrative bodies as well as subordinate production units of the main branches of the country's mineral industry for 1992. (*See table 2.*) The eventual development and transformation of Serbia and Montenegro's economy to a market-based system would require a reevaluation of the country's mineral resources from a market perspective. Reserves, as defined by market economies, are mineral deposits that can be mined at a profit under existing conditions with existing technology. In centrally planned and other non market economy countries, such as the former Yugoslavia, political rather than economic consideration was paramount in formulating policies for industrial development. For a detailed explanation of the system that was used for measuring reserves, see the chapter on Russia in this series.

The issue of Serbia and Montenegro's official foreign commerce and trade was moot from 1992 through most of 1995 because of the international trade embargo. In the years preceding the dissolution of Yugoslavia and the subsequent civil war, the country was an important minerals trader in both Eastern Europe and Western Europe.

Serbia and Montenegro's bauxite mining, alumina-refining, and aluminum-smelting facilities were located chiefly in Montenegro. Rudnici Boksita Niksic operated bauxite mines in Montenegro, and RB Kosovo Klina operated mines in Serbia. The entire output of the latter operation in the past had been exported because of the unsuitability of the bauxite for domestic refineries. Apart from the deposits exploited by RB Kosovo Klina, which contained a refractory-grade diaspore material, Montenegro's monohydrate (boehmitic) bauxite deposits were suitable for metallurgical end use. These deposits are lenticular- or irregular-shaped bodies occurring in Triassic and Eocene carbonate rocks. According to official sources, the production of bauxite practically ceased in 1994 but apparently began to revive in 1995. Aluminum production was expected to increase to about 60,000 t in 1996, owing to the lifting of sanctions against Serbia and Montenegro.[4]

Serbia and Macedonia were the former Yugoslavia's principal copper-producing areas. Rudarsko Topionicki Bazen's Bor mining, beneficiation, and smelting complex in Serbia accounted for all of the country's mine output of copper from its Bor, Majdanpek, and Veliki Krivelj open pit mines. On balance, the country's copper industry in 1995 appeared more robust than other branches of the metals-producing sector. A major event for the copper industry in 1995 was a study to determine optimum development parameters for the new Cerovo-Cementacija Mine in the Bor area.[5]

Serbia and Montenegro's share of the former Yugoslavia's total mine production of lead-zinc ore constituted slightly more than 40% in 1990. The hydrothermal metasomatic lead-zinc deposits are irregular but compact bodies in limestone and siliceous rocks that reportedly range from several thousand to several Mt. The Trepca deposit in the Kosovo Province of Serbia was the country's largest lead-zinc deposit. Reportedly, since the mid-1960's, some lead-zinc ores and concentrates had been imported to meet the needs of the country's smelters and refineries. Additionally, some of Serbia and Montenegro's refinery capacity had been used to toll refine lead for foreign consumers. In late 1995, the Trepca lead and zinc mining, beneficiation, smelting, and refining complex in Kosovo announced plans to combine all of the country's lead and zinc operations into one organization. The company also announced plans to produce 70,000 t of refined lead. 55,000 t of zinc, 12,000 t of car batteries, and about 70 t of silver and gold products in 1996.[6] The Trepca enterprise also indicated that about 80% of its production would be exported, which would amount to about US$250 million.

The iron and steel industry registered strong recovery in 1995 in terms of the output of pig iron, crude steel, and semimanufactures. From 1991 to yearend 1995, the country's steel industry, having been denied the important formerly domestic markets during the conflict in the Republics of Bosnia and Herzegovina, Croatia, Macedonia, and Slovenia, and well as access to international commerce, was forced into rapid contraction, marked by several industrial closures. Despite the embargo, the Russian Federation in early 1995, reportedly agreed to supply the Metalurski Kombinat Smederevo with natural gas. During the negotiations, it also was reported that the possibility of establishing joint ventures between Smederevo and Russian companies had been discussed.[7]

Serbia and Montenegro had produced a large number of industrial minerals that included barite, bentonite, gypsum, kaolin, magnesite, and pumice for domestic needs as well as export. However, owing to the dislocations in the country's economy from 1991 to 1995, the output of many of these commodities had been reduced. Companies such as Magnohrom managed to remain in operation at a

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significantly lower rate of output than rates attained before 1992. Magnohrom's limited output of magnesia-based brick, mortars, and other products were consumed by domestic enterprises also operating at reduced production levels.[8]

Prior to 1992, the country was a net importer of energy, mainly in the form of natural gas and petroleum that had been embargoed since 1992. Consequently, priority was given for the domestic production of fuels. Reportedly, the embargo denied the country's petroleum industry needed imports of chemicals, and spare parts, which caused problems for this sector throughout the year. Serbia and Montenegro's energy sector infrastrucure included pipelines for crude petroleum that were 415 km in length, while those for refinery products and natural gas were 130 km and 2,110 km, respectively.

Serbia and Montenegro in the long term could remain important European producer of minerals because of its resources of a number of metalliferous and industrial minerals. The political future of the country and the types of government structures that will emerge are difficult to foresee. However, in the post-civil war and/or post-embargo period, Serbia and Montenegro will require extensive modernization of its infrastructure, giving added importance to the construction materials and structural steels sectors in the country.

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[1] INDEX, Monthly Review of Economic Statistics, Federal Statistical Office, Federal Republic of Yugoslavia, No. 12, 1995, pp. 2-3.
[2] ___.Work cited in footnote 1, p. 4.
[3] Federal Secretariat for Development, Environment Division. Yugoslavia, National Report to the United Nations Conference on Environment and Development, 1991.
[4] Mining Journal (London), Jan. 12, 1996, p. 27.
[5] World Mining Equipment, Jan.-Feb., 1995, p. 32.
[6] Mining Journal (London) Jan. 12, 1996, p. 27.
[7] FBIS-EEU-95-047, Mar. 10, 1995, p. 37; from Politika (Belgrade) Feb. 7, 1995, p. 11.
[8] Industrial Minerals, Feb. 1996, p. 29.

TABLE 1
SERBIA AND MONTENEGRO: PRODUCTION OF MINERAL COMMODITIES 1/ 2/

(Metric tons unless otherwise specified)

Commodity		1991	1992	1993	1994	1995 e/
METALS						
Aluminum:						
Bauxite, gross weight		900,000	792,000	102,000	--	60,000 4/
Alumina, calcined, gross weight		208,000	197,000	12,000	-- r/	35,312 4/
Metal, ingot, primary and secondary		75,792 r/	66,947 r/	25,778 r/	6,850	16,991 4/
Antimony:						
Mine and concentrate ouput:						
Ore, gross weight		--	--	--	--	--
Sb content of ore		--	--	--	--	--
Concentrate, gross weight		--	--	--	--	--
Metal		19	10	(3/)	(3/)	(3/)
Bismuth, metal		70	60	30	88 r/	86 4/
Cadmium	kilograms	59,636 r/	8,136 r/	6,301 r/	3,000	11,079 4/
Chromite, concentrate (produced largely from imported ores)		4,250	--	--	--	--
Copper:						
Mine and concentrator output:						
Ore, gross weight	thousand tons	25,758 r/	23,085 r/	18,189 r/	17,935 r/	20,206 4/
Cu content of ore		121,842 r/	97,811 r/	68,007 r/	84,843 r/	87,575 4/
Concentrate, gross weight		519,274 r/	423,490 r/	297,878 r/	354,916 r/	363,332 4/
Metal:						
Blister and anodes:						
Primary		95,800	79,953 r/	44,112 r/	69,111 r/	70,074 4/
Remelted		58,724 r/	47,967 r/	13,286 r/	17,440 r/	17,336 4/
Total		154,524 r/	127,920 r/	57,398 r/	86,551 r/	87,410
Refined:						
Primary		95,079 r/	78,560 r/	43,410 r/	66,308 r/	71,304 4/
Remelted		39,114 r/	36,203 r/	7,890	5,841 r/	7,147 4/
Total		134,193 r/	114,763 r/	51,300	72,149	78,451
Gold, refined	kilograms	6,920	7,330	3,330	4,000	4,000
Iron and steel:						
Ore and concentrate: Agglomerate		703,645 r/	704,340 r/	106,301 r/	32,000	30,000
Metal:						
Ferroalloys: Ferronickel		11,775 r/	6,481 r/	1,283 r/	1,400	1,400
Pig iron		525,513 r/	512,005 r/	62,490 r/	17,000	108,000 4/
Crude steel		715,410 r/	664,934 r/	183,383 r/	137,000	180,000 4/
Semimanufactures		867,000	733,000	174,000	174,000	201,000 4/

See footnotes at end of table.

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TABLE 1--Continued
SERBIA AND MONTENEGRO: PRODUCTION OF MINERAL COMMODITIES 1/ 2/

(Metric tons unless otherwise specified)

Commodity		1991	1992	1993	1994	1995 e/
METALS--Continued						
Lead:						
Mine and concentrate output:						
Ore, gross weight (Pb, Zn ore)		1,237,000 r/	804,000	337,000	272,208 r/	510,942 4/
Pb content of ore		33,910 r/	22,661 r/	9,229 r/	6,651 r/	11,689 4/
Concentrate, gross weight		43,089 r/	25,504 r/	10,672 r/	7,500 r/	16,720 4/
Pb content of concentrate		14,200	8,820	3,510	2,800	4,000
Metal:						
Smelter, primary and secondary		51,026 r/	30,312 r/	8,593 r/	6,500	15,000
Refined, primary and secondary		44,091 r/	23,265 r/	6,393 r/	4,460	12,500
Magnesium: Metal		5,360	4,055 r/	--	2,000	2,000
Nickel: Metal, Ni content of Fe Ni		4,200	1,860	443	603 r/	962 4/
Platinum-group metals:						
Palladium	kilograms	155	130	72	47 r/	46 4/
Platinum	do.	22	19	10	7 r/	6 4/
Selenium	do.	64,140 r/	57,800	27,677 r/	27,340 r/	39,810 4/
Silver	do.	69,918 r/	66,420 r/	25,144 r/	18,298 r/	11,347 4/
Zinc:						
Zn content of Pb, Zn ore		31,428 r/	19,718 r/	9,704 r/	6,794 r/	11,515 4/
Concentrator output, gross weight		52,574 r/	31,829 r/	14,944 r/	7,500 r/	21,297 4/
Zn content of concentrate		10,143 r/	5,950	1,910 r/	1,800	4,000
Refined		38,648 r/	14,182 r/	6,985 r/	3,895 r/	5,976 4/
INDUSTRIAL MINERALS						
Asbestos fiber, all grades		1,765 r/	1,175 r/	314	498 r/	300
Cement	thousand tons	2,411 r/	2,036 r/	1,088 r/	1,612 r/	1,696 4/
Clays:						
Bentonite		260	200	110	215 r/	192 4/
Ceramic clay		51,213 r/	50,343 r/	23,367 r/	22,092 r/	28,095 4/
Fire clay:						
Crude		67,169 r/	96,643 r/	18,481 r/	34,080 r/	20,988 4/
Calcined		16,600	-- r/	4,825 r/	5,376 r/	4,091 4/
Kaolin:						
Crude		152,649 r/	111,782 r/	37,627 r/	50,000	50,000
Washed		11,700	9,300	4,800	7,110 r/	4,900 4/
Feldspar, crude		9,309 r/	5,111 r/	2,679 r/	3,238 r/	2,904 4/
Gypsum, crude		42,595 r/	47,865 r/	--	40,411 r/	40,342 4/
Lime	thousand tons	680	565	318	369	420
Magnesite:						
Crude	do.	210	185	55	53 r/	61 4/
Caustic calcined		10,034 r/	12,958 r/	7,812 r/	5,896 r/	4,070 4/
Mica, all grades		541	281	68	75 e/	75
Nitrogren, N content of ammonia		170,000	148,000	99,900	159,000 r/	150,000
Pumice and related volanic materials, volcanic tuff		101,557 r/	108,792 r/	74,230 r/	80,000 e/	80,000
Quartz sand	thousand tons	1,249 r/	922	270	403 r/	400
Salt, all sources		34,603 r/	46,945 r/	38,867 r/	32,086 r/	16,000
Sand and gravel excluding glass sand	thousand cubic meters	7,037 r/	5,343 r/	1,669 r/	1,814 r/	2,200
Sodium compounds:						
Caustic soda		51,332 r/	21,176 r/	4,086 r/	4,748 r/	6,700
Sodium sulfate		18,951 r/	10,948 r/	3,668 r/	3,500 e/	3,500
Stone, excluding quartz and quartzite: Dimension, crude:						
Ornamental	square meters	233,515 r/	276,569 r/	212,581 r/	213,000	215,000
Crushed and broken, n.e.s.	thousand cubic meters	4,059 r/	2,872 r/	1,157 r/	1,571 r/	1,500
Other	cubic meters	10,400	10,000 e/	5,000	5,000	5,000
Sulfur: e/						
Sulfur content of pyrite	thousand tons	61 4/	3 4/	1 4/	1	1
Byproduct:						
Metallurgy		140	130	110	110	110
Petroleum		1	1	1	1	1
Total		202	134	114	112	112

See footnotes at end of table.

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TABLE 1--Continued
SERBIA AND MONTENEGRO: PRODUCTION OF MINERAL COMMODITIES 1/ 2/

(Metric tons unless otherwise specified)

Commodity		1991	1992	1993	1994	1995 e/
MINERAL FUELS AND RELATED MATERIALS						
Coal:						
Bituminous	thousand tons	122	102	73	82	60
Brown	do.	690	703	531	529	560
Lignite	do.	39,598 r/	39,300	36,829 r/	37,740 r/	38,000
Natural gas, gross production	million cubic meters	749	846	962	824	890
Petroleum:						
Crude:						
As reported	thousand tons	1,100	1,165 r/	1,148 r/	1,078 r/	1,070
Converted	thousand 42-gallon barrels	8,160	8,640	8,520	8,000	8,000
Refinery products e/	do.	45,000	25,000	15,000	13,800	13,000

e/ Estimated. r/ Revised.
1/ Table includes data available through Apr. 1996.
2/ In addition to commodities listed, common clay and diatomite also are produced, and tellurium may be recovered as a copper refinery byproduct, but available information is inadequate to make reliable estimates of output levels.
3/ Less than 0.25 ton.
4/ Reported figure.

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TABLE 2
SERBIA AND MONTENEGRO: STRUCTURE OF THE MINERAL INDUSTRY FOR 1995

(Thousand of metric tons unless otherwise specified)

Commodity		Major operating companies	Location of main facilities	Annual capacity
Alumina		Kombinat Aluminijuma Titograd	Plant at Titograd, Montenegro	200.
Aluminum		do.	Smelter at Titograd, Montenegro	100.
Antimony, ores and concentrates		Zajaca, Rudarsko Tapionicarski Baze	Mines and mills near Zajaca, Serbia	80.
Do.		do.	Mines and mill at Rajiceva Gora, Serbia	300.
Antimony, metal		do	Smelter at Zajaca, Serbia	4.
Bauxite		Rudnici Boksita, Niksic	Mines in Montenegro at Kutsko Brdo, Zagrad, Biocki Stan, Durakov Dol, and other locations	650.
Coal:				
Bituminous		Ibarski Rudnici Kamenog Uglja	Mines at Jarando and Usce, near Bal'evac na Ibru, Serbia	250.
Lignite		SOUR Kolubara, Rudarsko Energetsk Industrijski Kombinat, RO	Opencast mines: Polje B and Polje D	10,000.
Do.		Kolubara Povrsinski Kopovi	Tamnavski Kopovi (also known as Kolubarski Rudnici Lignita), near Vreoci, Serbia	14,000.
Do.		SOUR Elektroprivreda Kosova, RO Kosovo, Proizvodnja Separacija i Transport Uglja	Opencast mines: Dobro Selo and Belacevac, near Obilic, Serbia	2,000.
Cement		Becinska Fabrika Cementa	Plant at Beocin, Serbia	2,031.
Do.		Fabrika Cementa Novi Popovac	Plant at Popovac, Serbia	1,613.
Copper		Rudarsko Topionicki Bazen Bor	Smelter at Bor, Serbia	180.
Do.		do.	Electrolytic refinery at Bor, Serbia	180.
Do.		do.	Mine and mill at Bor, Serbia	5,000 ore.
Do.		do.	Mine and mill at Majdanpek, Serbia	15,000 ore.
Do.		do.	Mine and mill at Veliki Krivelj, Serbia	8,000 ore.
Lead-zinc ore		Rudarsko-Metalursko-Hemijski Kombinat za Olovo i Cink Trepca	Mines at Ajvalija, Kopanaonik, Badovac; Trepca, Blagodat, Lece; Veliki Majdan, Tisovak; and Kisnica, Rudnik, Suplja Stena	5,000.
Do.		do.	Mills at Kriva Feja, Lece, Rudnik, Badovac, Leposavic, Zvecan, and Maravce, Suplja Stijena	3,160.
Do.		Hemijska Industrija Zorka: Brskovo, Rudnici Olova i Cinka	Mine at Brskovo, Montenegro	500.
Do.		Veliki Majdan Rudnik Olova i Cinka	Mine at mill near Krupanj, Serbia	250.
Lead, metal		Rudarsko Metalursko Hemijski Kombinat za Olovo i Cink Trepca	Smelter at Zvecan, Serbia	180.
Do.		do.	Refinery at Zvecan, Serbia	90.
Magnesite, concentrate		Rudnici Magnezita "Sumadija"	Mine and plant at Sumadija, 20 kilometers northwest of Cacak, Serbia	120.
Do.		Rudnik i Industrija Magnezita "Strezovce"	Opencast mine at Beli Kamen, Strezovce, near Itiova Metrovica, Serbia	300.
Do.		do.	Sinter plant at Strezovce	40.
Do.		Magnohrom, Rudnik Magnezita "Magnezit"	Mine at Bela Stena, Baljevac na Ibru, Serbia	30.
Natural gas	million cubic feet	Naftaplin (Naftagas), RO za Istrazivanje, i Prozvodnju Nafte i Gasa	Natural gasfields in Serbia Kinkinda and others	30,000.
Petroleum:				
Crude	thousand barrels per day	Naftagas, Naftna Industrija	Oilfields in Serbia: Kikinda and others	30.
Refined	do.	Naftagas, Naftna Industrija:		
Do.	do.	Rafinerija Nafte Pancevo	Refinery at Pancevo, Serbia	110.
Do.	do.	Rafinerija Nafte Novi Sad	Refinery at Novi Sad, Serbia	28.
Pig iron		Metalurski Kombinat, Smederevo	Blast furance at Smederevo, Serbia	720.
Steel, crude		do.	Plant at Smederevo, Serbia	600.
Zinc metal		Rudarsko Metalursko Hemijski Kombinat Olova i Cinka Trepca, Metalurgija Cinka	Electrolytic plant at Titova Metrovica, Serbia	40.
Do.		Hemijska Industrija Zorka	Electrolytic plant at Sabac, Serbia	40.

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THE MINERAL INDUSTRY OF

SLOVAKIA

By Walter G. Steblez

By European standards, Slovakia's production of ferroalloys, iron and steel, nonferrous metals, and mineral fuels, such as coal and petroleum, was modest. The country, however, was a significant regional producer of a broad range of industrial minerals for domestic and export markets. In 1995, the transformation of Slovakia's economy from a system of central economic planning to a market-based system continued with attendant elements, such as declining employment in state-owned enterprises and declining industrial production and volume of foreign trade. On the other hand, a substantial number of the country's enterprises reportedly had been privatized. Foreign investment in Slovakia's commercial operations in 1995 also was noteworthy in the aluminum and gold sectors. The Government of Slovakia continued to implement policies and programs concerned with denationalizing and rationalizing the economy, but some reforms were implemented at a generally slower pace than that adopted in the neighboring Czech Republic. Apart from the domestic privatization program through the Government's State Property Fund, the Government of Slovakia also encouraged foreign investment in the country's mineral and other industrial projects by allowing joint ventures and the full acquisition of former state-owned properties.[1]

Industrial pollution, including that associated with the minerals sectors, remained an important issue for the country. As in other former centrally planned economy countries of Europe, severe air pollution in Slovakia has been caused by the use of high-sulfur, low-grade coal and lignite to power the country's thermal electric power stations and by the country's chemical and metallurgical industries. According to sources in the Ministry of the Environment (MoE), efforts to further reduce the emission of sulfur dioxide into the atmosphere were to continue. Data, made available by the MoE, indicated that from 1990 to 1992 the emission of sulfur dioxide had been reduced by 45% to 50%.[2]

Despite the division of former Czechoslovakia into separate countries, legislation adopted since 1990 to protect the environment has remained operative. CSFR Law No. 309/91 on the Protection of the Atmosphere from Polluting Substances (9/91) codified regulations concerning air pollution; defined sources of pollution and set pollution limits; defined legal obligations of pollution source operators; and defined air pollution control authorities and fees and penalties associated with atmospheric pollution. Czechoslovak Law on Environment of 12/91 established the basic definitions and principles regarding environmental protection as well as the obligations of "legal and physical persons (bodies)" for protecting the environment during the use of natural resources.

Following Slovakia's major adjustments to market economy requirements in 1992, the drop in output of most mineral commodities appeared to have slowed considerably during 1994-95. (*See table 1.*)

Despite the increasing orientation of the country's foreign commerce toward Western European market economy countries in recent years, Russia and other former member-countries of CMEA remained Slovakia's chief partners in mineral commodity trade. Russia remained Slovakia's principal supplier of natural gas and petroleum, and Hungary and Ukraine, respectively, were major suppliers of bauxite and iron ore to Slovakia's metal industries. Table 2 lists the administrative bodies as well as subordinate production units of the main branches of the country's mineral industry in 1993.

In 1995, the major events in the country's metals sector included the start of operation of a new aluminum electrolysis unit at the country's Zhar nad Hronom aluminum plant. The technology and equipment was supplied by Hydro-Norsk Aluminum of Norway. Financing for the project was obtained through a US$110 million loan from the European Bank for Reconstruction and Development.[3] In the country's gold producing sector, Slovenska Banska Spolocnost reportedly mined 64,000 tons of ore at its Hodrusa-Hamre gold mining operation in 1994. The company also reported the output of gold for 1994 at 300 kilograms.[4] Foreign commercial activity in Slovakia's steel industry in 1995 reportedly included discussions between representatives of Vychodoslovenske Zeleziarne Steel Co. and the BHP Co. Ltd. of Australia concerning a trade agreement that could shift some of the iron ore that Slovakia has traditionally imported from Ukraine toward Australia. BHP already has been able to penetrate the Eastern European steel market, having reached an agreement with Romania for the delivery of 1 Mt/yr of iron ore.[5]

Industrial minerals and construction materials continued to have a significant role in the country's domestic and export markets. Slovakia's chief industrial mineral products included cement, gypsum, lime, magnesite,

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perlite and stone. The demand for cement, industrial minerals, and construction materials appeared to be increasing because of growing large-scale projects for modernizing infrastructure, including new projects, such as a new highway to Western Europe; a major new land port near Kosice, which would include railway reloading and storage facilities and associated services; and a new truck terminal in Bratislava.

In 1993, the Government approved a plan for denationalizing the country's coal-mining industry. Under the provisions of this plan, the Ministry of Industry would oversee the privatization of the coal mining sector but would impose stricter regulations requiring compliance with environmental regulations by industry than had been previously the case. It was envisaged that coal production would be maintained at slightly more than 4 Mt/yr, but that the country's consumption of coal would eventually decrease from about 11 Mt/yr to slightly more than 6 Mt/yr.

Taking into account Slovakia's transition to a market economy, the country's mineral reserves would have to be reevaluated under market economy conditions. As defined in market-economy countries, reserves are those mineral deposits that can be mined at a profit under existing conditions with existing technology. In former CMEA countries, including Slovakia, the prior policies for centrally planned industrial development often had more to do with political than economic considerations.

Slovakia's mineral industries are expected to continue to supply the country with steel, industrial minerals, and mineral fuels that gain importance during the modernization of the infrastructure and the transition of the economy to a market system.

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[1] BBC SWB. EEW/0323, Mar. 10, 1994, p. WA/2; from Press Agency of the Slovak Republic 1355 gmt, Feb. 28, 1994.

[2] BBC SWB, EEW/0338, June 23, 1994, p. WA/6; from TASR News Agency, Bratislava, 1004 gmt, June 13, 1994.

[3] FBIS-EEU-95-185-S, Sept. 25, 1995 p. 22; from Bratislava SME, Aug. 26, 1995, p. 3, and Bratislava PRAVDA Aug. 26, 1995, p. 3.

[4] FBIS-EEU-95-083-S, Oct. 21, 1994, p. 24; from Narodna Obroda Mar. 27, 1995, p. 5.

[5] Mining Journal (London), July 7, 1995, p. 7.

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TABLE 1
SLOVAKIA: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity		1991	1992	1993	1994	1995 e/
METALS						
Aluminum:						
Alumina		187,000	143,000	140,000	75,000	100,000
Aluminum ingot, primary		49,400	60,400	60,000	30,000	40,000
Antimony, mine output, Sb content e/		450	450	450	--	--
Cobalt metal		60	68	--	--	--
Copper:						
Mine output:						
Ore, gross weight		225,000	340,000 r/	310,000 r/	290,000	250,000
Concentrate:						
Gross weight		11,300	2,210	2,000	2,000	2,000
Cu content e/		2,600 2/	537	500	500	500
Metal:						
Smelter, primary e/		3,500	3,000	3,000	3,000	3,000
Refined, primary and secondary		25,300	28,100	28,000	25,000	25,000
Gallium metal	kilograms	1,400 e/	1,300	1,300	600	600
Gold metal e/	do.	18	18	18	15	15
Iron and steel:						
Iron ore:						
Gross weight	thousand tons	1,630	1,220 r/	920 r/	860	850
Fe content	do.	460 e/	330 r/	250 r/	230	225
Metal:						
Pig iron	do.	3,160	3,020	3,210 r/	3,330	3,300
Ferroalloys, total electric furnace 3/	do.	162	122	120	120	120
Ferrochromium		41,200 r/	52,500 r/	50,600 r/	48,500	48,000
Steel, crude	thousand tons	4,110	3,600 r/	3,770 r/	3,790	3,800
Semimanufactures	do.	3,280	3,130 r/	3,320 r/	3,380	3,300
Lead, mine output:						
Concentrate, gross weight		4,630	3,500	3,500	3,500	3,500
Pb content e/		2,400	1,800	1,800	1,800	1,800
Mercury		75	60	50	--	--
Nickel metal, primary		2,400	1,620	--	--	--
Tin-tungsten ore, gross weight	thousand tons	120	160	190	190	--
Zinc:						
Mine output:						
Ore, gross weight		250,000 r/ e/	370,000	300,000	280,000	280
Concentrate, gross weight		6,850	6,900	6,500	6,500	6,500
Zn content e/		3,100	3,100	2,900	2,800	2,800
Metal, secondary		811	1,070	1,000	1,000	1,000
INDUSTRIAL MINERALS						
Barite		85,000	31,300	30,000	85,000 r/	90,000
Cement, hydraulic	thousand tons	2,680 e/	2,500	2,500	2,500	2,500
Clays:						
Bentonite e/		25,000	25,000	25,000	72,000 r/	75,000
Kaolin		25,000 e/	25,000	25,000	40,000 r/	40,000
Diamond, synthetic e/	carats	5,000	5,000	5,000	5,000	5,000
Dolomite	thousand tons	4,500 e/	4,500	2,500 r/	1,700 r/	18,000
Fertilizer, manufactured:						
Nitrogenous, N content		175,000	175,000	170,000	170,000	170,000
Phosphatic, P2O5 content		122,000	120,000	120,000	120,000	120,000
Potassic, K2O content		11,500	11,000	10,000	10,000	10,000
Mixed		55,700	50,000	50,000	50,000	50,000
Gypsum and anhydrite, crude		75,000	75,000	75,000	122,000 r/	120,000
Lime, hydrated and quicklime	thousand tons	1,080	1,070	1,070	1,000	1,000
Magnesite, crude		328,000	1,270,000	1,200,000	825,000 r/	800,000
Nitrogen, N content of ammonia e/		200,000	250,000	263,000	250,000	250,000
Perlite		50,000	50,000	50,000	28,000 r/	30,000
Pyrite, gross weight e/		100,000	100,000	-- r/	-- r/	--
Salt		74,000	70,000	70,000	123,000 r/	120,000

See footnotes at end of table.

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TABLE 1--Continued
SLOVAKIA: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity		1991	1992	1993	1994	1995 e/
MINERAL FUELS AND RELATED MATERIALS						
Stone:						
Limestone and other calcareous stones	thousand tons	4,210	4,500	4,500	3,887 r/	4,000
Quarry stone, not further described	thousand cubic meters	5,200	5,000	5,000	5,000	5,000
Zeolite		25,000 e/	25,000	25,000	13,000 r/	15,000
Coal, brown and lignite	thousand tons	4,150	4,000	3,500	3,600 r/	3,600
Coke:						
Metallurgical	do.	1,840	1,800	1,880 r/	1,900	1,900
Unspecified	do.	331	300	300	200	200
Gas, manufactured, coke oven	million cubic meters	912	900	900	900	900
Petroleum:						
Crude:						
As reported	thousand tons	72	70	70	55 r/	60
Converted	thousand 42-gallon barrels	488 e/	475	475	475	480
Refinery products e/	do.	40,500	40,500	40,500	40,500	40,500

e/ Estimated. r/ Revised.
1/ Table includes data available through May 1996. In addition to the commodities listed, arsenic, diatomite, feldspar, illite, sodium compounds, sulfur, sulfuric acid, and talc are produced, but information is inadequate to make reliable estimates of output.
2/ Reported figure.
3/ May include some FeCrSi and FeNi, if any was produced.

TABLE 2
SLOVAKIA: STRUCTURE OF THE MINERAL INDUSTRY FOR 1995

(Thousand of metric tons unless otherwise specified)

Commodity		Major operating companies 1/	Location of main facilities 2/	Annual capacity
Aluminum		SNP Aluminum Works	Ziar and Hronom, central Slovakia	60
Antimony, ore		Liptovska Dubrava	Central Slovakia	50
Do.		Pezinok	West Slovakia	50
Smelter		Vajskova	Central Slovakia	2
Cement		Lietavska Lucka, Stupava, and Turna	Slovakia	5,400
Coal, brown		ULB administration	Prievidza, central Slovakia	6,800
Copper:				
Ore		Slovinky, Hodrusa-Hamre, and Rudnany	Central Slovakia	500
Refinery		Krompachy	do.	27
Gallium	kilograms	SNP Aluminum Works	Ziar and Hronom, central Slovakia	4,000
Iron:				
Ore		Nizana Slana and Rudnany	Central Slovakia	1,600
Concentrate		do.	do.	1,300
Lead-zinc, ore		Banska Stiavnica	do.	200
Magnesite		SMZ administration	East Slovakia	550
Mercury	metric tons	Dubnik, Malachov, and Rudnany	Central Slovakia	150
Nickel, smelter		Niklova Huta	Sered, south Slovakia	5
Petroleum, refinery		Bratislava, Strazske, and Zvolen	Slovakia	NA
Steel, crude		Vychodoslvenske Zeleziarne sp (East Slovak Iron and Steel Works)	Slovakia, Kosice	4,000
Do.		Svermove zeleziarne	Slovakia, Podbrezova	600

NA Not available.
1/ All mining companies are Government-owned.
2/ Names and locations of mines and crude oil refineries are identical.

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THE MINERAL INDUSTRY OF

SLOVENIA

By Walter G. Steblez

Slovenia was a modest producer of minerals within the framework of the minerals industry in the former Yugoslavia. Although industrial minerals and fossil fuels were produced to meet Slovenia's industrial requirements, the country was a net importer of many of these commodities. Reportedly, Slovenia had the most modern and technologically advanced fabricating industry among the republics of the former Yugoslavia and a per capita national income equal to about twice the average of the former Yugoslavia.

Following the dissolution of Yugoslavia in 1991, the Government of Slovenia focused its efforts to limit economic dislocations, in terms of employment, production, and foreign commerce. Concurrently, the Government sought to limit the rate of inflation and to bring the country's economy in line with Western European market practices. Enterprises in the country's mineral industries no longer were required to produce at all costs, as many of them did under central planning in the former Yugoslavia. The policy of closing unprofitable operations, as had been the case with mercury and uranium mining, reportedly would be continued. Also, the Government reportedly attempted to create financial incentives for foreign investors relative to the country's steel industry.

Major concern over environmental issues in Slovenia reportedly had warranted the inclusion of provisions for protecting the environment in the country's new constitution. The constitution stressed the importance of protecting the environment and defined the Government's role in controlling the quality of the country's environment. In 1993, a draft of the Environmental Protection Law outlined the Government's general policies for protecting the environment and specified regulations for commercial natural resource use, the establishment of an inspection directorate, and the establishment of provisions for monitoring, environmental impact assessments, and research. The Slovenian Ministry of Environmental Protection and Physical Planning was established to undertake this work. Major sources of pollution included the use of lignite and brown coal, nonferrous metals processing, and the petrochemical sectors.

The production table for Slovenia was compiled from data presented in "Statisticni Letopis Republike Slovenije" (The Statistical Abstract of the Republic of Slovenia) for 1993 (latest available data) and in a variety of earlier statistical publication of the former Yugoslavia through 1991. *(See table 1.)*

The former domestic Yugoslav market was an important element in Slovenia's mineral trade. With the dissolution of Yugoslavia, commerce with the country's former domestic trading partners became classified as foreign trade. Moreover, most trade with Slovenia's former trading partners in the former republics of Yugoslavia had become untenable because of the civil wars in the Republics of Bosnia and Herzegovina and Croatia in 1991-93. Additionally, international trade embargoes were levied against Serbia and Montenegro of the former Yugoslav federation, which also were Slovenia's traditional commercial partners. Consequently, Slovenia oriented its trade to a greater degree toward markets in the European Union.

Table 2 lists the apparent administrative bodies as well as subordinate production units of the main branches of the country's mineral industry in 1995. *(See table 2.)*

Aluminum and steel were the major metal commodities produced in Slovenia. Slovenia produced alumina and aluminum at the refinery and smelter operated by Unial, Tvornica Glinice i Aliminija Boris Kidric in Kidricevo. Lacking a domestic bauxite mining industry, Slovenia in past years relied on other republics of the former Yugoslavia as suppliers of bauxite and other major minerals. Consequently, the need to obtain new sources of bauxite continued to be a concern for the country's aluminum industry.

Slovenia's steel industry consisted of three steel mills operated by Zdruzeno Podjetje Slovenske Zeljezare at Jesenice, Ravna na Kuroskem, and Štore. The combined capacity at the facilities was about 800,000 t/yr of steel. Although open-hearth steel capacity at the Jesenice steel mill amounted to about 300,000 t/yr, only a small portion of this capacity had been utilized in recent years. More than 90% of the steel produced in the country was at electric furnaces at the three steel mills that used steel scrap as a feedstock. Ferroalloys were produced at the Tovarna Dusika Ruse ferroalloys plant. In recent years, the production of ferrosilicon was reported to have been reduced by 75% to about 4,000 t/yr; that of ferrochromium was reduced by about 50% to about 8,000 t/yr, one-half of which was designated for export. The company reportedly also produced very small quantities of low-carbon ferrochromium and ferrosilicomanganese. Most of the

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company's ferrochromium production has been sold directly to the country's stainless steel producer, Slovenia Steel; some reportedly has been exported to Austria. On the other hand, the country's entire output of ferrosilicon has been consumed by its domestic steel producers.

Apart from being a substantial producer of glass sand (about 400,000 t/yr), Slovenia was a modest producer of clays, gypsum, ornamental stone, and other industrial minerals, mostly for domestic uses.

Slovenia was the only republic in the former Yugoslav federation to have produced all forms of commercial energy: coal, lignite, natural gas, petroleum, and uranium. The production of uranium, however, was discontinued in 1991. The country generated electricity by means of hydroelectric power stations and conventional as well as nuclear thermal electric power stations. In December 1993, the management of Elektrogospodarstvo Slovenije reportedly announced plans to close the country's nuclear power station at Krsko owing to a shortage of capital to operate the facility and the lack of a suitable location to store radioactive waste.

The transformation of Slovenia's economy to a market-based system will involve a reevaluation of the country's mineral resources from a market perspective. For a detailed description of the system that was used to measure reserves in the former Yugoslavia, see the chapter on the Mineral Industry of Russia in this series.

Slovenia had not been severely affected by the civil war that occurred in the former Yugoslavia, and the country's industries and infrastructure remained mostly intact. Because of Slovenia's relatively advanced industry and infrastructure, the country has been adapting more easily to Western European economic practices than most other former centrally planned economy countries in Central Europe.

TABLE 1
SLOVENIA: APPARENT PRODUCTION OF MINERAL COMMODITIES 1/ 2/

(Metric tons unless otherwise specified)

Commodity		1991	1992	1993	1994	1995 e/
METALS						
Aluminum:						
Alumina		48,000	45,000	40,000	40,000	40,000
Metal, ingot, primary and secondary		90,200	85,000	80,000	80,000	80,000
Iron and steel, Metal:						
Ferroalloys:						
Ferrochromium		12,500	17,100	9,000	9,000	9,000
Ferrosilicocalcium		500	400	200	200	200
Ferrosilicon		16,000	14,000	12,000	12,000	12,000
Crude steel, from electric furnaces		287,000	300,000	300,000	300,000	300,000
Semimanufactures e/		200,000	100,000	100,000	100,000	100,000
Lead:						
Mine and concentrator output:						
Ore, gross weight (Pb-Zn ore)		162,000	152,000	--	--	--
Pb content of ores		2,600	2,000	--	--	--
Concentrate, gross weight		2,500	1,770	--	--	--
Metal:						
Smelter, primary and secondary		15,000	6,000	6,000	6,000	5,000
Refined, primary and secondary		9,570	4,000	4,000	4,000	3,000
Mercury e/	kilograms	9,000	7,000	--	--	--
Silver	do.	800	400	--	--	
Zinc:						
Zinc content of PbZn ore		2,500	1,550	--	--	--
Concentrate output, gross weight		6,000	5,570	--	--	--
Zn alloys from smelter e/		3,000	2,500	2,500	2,500	2,500
INDUSTRIAL MINERALS						
Cement	thousand tons	973	950	950	1,000	1,000
Clays: 3/						
Ceramic clay, crude		2,500	2,500	2,000	2,000	2,000
Fire clay, crude		3,000	3,000	3,000	3,000	3,000
Kaolin:						
Crude		15,000	15,000	10,000	10,000	10,000
Washed e/		5,000	5,000	4,000	4,000	4,000

See footnotes at end of table.

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TABLE 1 --Continued
SLOVENIA: APPARENT PRODUCTION OF MINERAL COMMODITIES 1/ 2/

(Metric tons unless otherwise specified)

Commodity		1991	1992	1993	1994	1995 e/
INDUSTRIAL MINERALS--Continued						
Gypsum, crude e/		12,000	10,000	10,000	10,000	10,000
Lime	thousand tons	350	250	250	300	300
Pumice and related materials, volcanic tuff e/		90,000	50,000	40,000	40,000	40,000
Quartz, quartzite, glass sand:						
Quartz and quartzite		12,000	10,000	10,000	10,000	10,000
Glass sand		350,000	300,000	200,000	200,000	200,000
Total		362,000	310,000	210,000	210,000	210,000
Salt, all sources e/		8,000	8,000	8,000	8,000	8,000
Sand and gravel, excluding glass sand	thousand cubic meters	2,300	2,000	2,000	2,000	2,000
Stone, excluding quartz and quartzite, dimension, crude: e/						
Ornamental	cubic meters	382,000	300,000	300,000	300,000	300,000
Other	do.	3,000	3,000	3,000	3,000	3,000
Crushed and brown, n.e.s.	thousand cubic meters	1,500	1,000	1,000	1,000	1,000
MINERAL FUELS AND RELATED MATERIALS						
Coal:						
Brown coal	thousand tons	1,250	1,100	1,100	1,100	1,000
Lignite	do.	3,910	4,000	4,000	4,000	4,000
Natural gas, gross producing	million cubic meters	19	20	20	20	20
Petroleum:						
Crude:						
As reported	thousand tons	2,400	2,400	2,400	2,400	2,400
Converted	thousand 42gallon barrels	18,000	18,000	18,000	18,000	18,000
Refinery products e/	do.	3,800	3,800	3,500	3,500	3,500

e/ Estimated.
1/ Table includes data available through May 1996.
2/ In addition to commodities listed, common clay also was produced, but available information is inadequate to make reliable estimates of output levels.

TABLE 2
SLOVENIA: STRUCTURE OF THE MINERAL INDUSTRY FOR 1995

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies	Location of main facilities	Annual capacity
Alumina	Unial, Tvornica Glinice in Aluminija Boris Kidric	Plant at Kidricevo, Slovenia	120
Aluminum	do.	Smelter at Kidricevo, Slovenia	72
Coal:			
Brown	SOZC, Rudarsko Energetski Kombinat E. Kardelj, Trobovlje, Slovenia	Mines: Sasavski Rudnici at Trbovlje, Hrastnik, Ojstro, Senovo, and Kanizarnica	1,300 2/
Lignite	Rudarsko Energetski Kombinat Velenje, RO Rudnik Lignita-Velenje	Mine at Velenje, Slovenia	5,000 2/
Cement	Salonit Anhovo	Plant at Anhovo, Slovenia	1,120
Lead metal	Rudnik Svinca in Topilnica, Mezica	Smelter at Mezica, Slovenia	35
Do.	do.	Refinery at Mezica, Slovenia	30
Mercury	Rudnik Zivega Srebra, Idrija	Mine and smelter in Idrija, Slovenia	15,000 1/
Petroleum, refined	Industrija Nafte (INA) Rafinerija Nafte Lendava	Refinery at Lendava, Slovenia	16 2/
Pig iron	Zdruzeno Podjetje Slovenske Zelezarne	2 blast furaces at Zelazara Jesenice, Slovenia	300
Do.	Zelezara Store	Electric reduction furnaces at Store pri Celju, Slovenia	290
Steel, crude	Zdruzeno Podjetje Slovenske Zelezarne	Plant at Jesenica, Slovenia	500
Do.	do.	Plant at Ravne, Slovenia	162
Do.	do.	Plant at Store, Slovenia	140

1/ Flasks per year.
2/ Thousand barrels per day.

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THE MINERAL INDUSTRY OF

SPAIN

By Harold R. Newman

Spain, whose land area includes a major portion of the Iberian Peninsula, is one of the most mineralized areas in Western Europe. The Iberian Pyrite Belt area is geologically very complex which allows more diverse possibilities for mineral resources. This area is considered the most significant mining district within the European Union (EU) and is an important source of nonferrous and precious metals.

The main polymetallic deposits from west to east are Tharsis, Scotiel, Rio Tinto, and Aznalcollar. Although Spain has a great diversity of deposits including metals, industrial minerals and coal, there are very few large mines, and mining activity was maintaining the downward trend of previous years.

Although the Government attempted to foster economic growth, it had to rationalize some of the Government-controlled industries. The coal and steel industries had to reduce production capacity in accordance with regulations governing Spain's acceptance into the EU.

The mineral industry operated in numerous regions throughout the country. The estimated value of Spanish mineral production in 1991, the latest year that full data were available, was about $374 million. Fifty percent of this value was attributed to the mineral fuels sector; 10% to the metals sector; and 40% to the industrial minerals sector, including ornamental stone. The number of persons employed in the minerals resource sector in 1992, the latest date data were available, was reported to be 67,000.

Within the EU, Spain was the largest producer of mined lead and zinc and a major producer of pyrite; it also had the highest level of self-sufficiency with respect to mineral raw materials. However, production continued to be sparse and only copper ore, iron ore, and pyrite were significant. The mercury mines at Almadén, operated at lower levels in response to international market conditions. There was a small increase in the output of lead and zinc ores.

The industrial growth in the EU contributed to the demand for quarried mineral products from Spain. Quarried natural stone accounted for 16% of the value of Spanish mining. With the exception of coal, it was the most important mining sector in dollar value in the country. *(See table 1.)*

Liberalization of foreign trade flows proceeded quickly after Spain entered the EU. The differences between Spanish tariffs and EU Common Market external tariffs had been mostly eliminated. Table 2 shows the impact of selected classes of mineral commodities on Spain's balance of payments position in relation to the EU and the world.

Spain was a large importer of mineral fuels, and it was expected that this situation would continue as the demand for energy increased. About 15% of consumption was satisfied by imported coal. Spain received about 80% of its gas supplies from Algeria and Libya, with the remaining supply provided from domestic production.

The mineral industry was composed of state and private-owned entities. Minerals belonged to the state under an arrangement known as the "Regalian Principal." The Mining Law of July 19, 1944, as amended, and the Hydrocarbon Law of December 26, 1950, as amended, governed the mineral industry. The Ministry of Industry and Energy implemented the mineral laws, regulated the private sector, and managed most of the state-owned companies through the Instituto Nacional de Industria (INI), a state holding company. INI and Instituto Geologico y Minero are the principal Government mineral- resource agencies. *(See table 3.)*

Alumina and primary aluminum were produced almost entirely by the Industria Española del Aluminio S.A. (Inespal). INI is Inespal's major shareholder. Alumina Española S.A., a subsidiary near San Ciprian, produced alumina, primary aluminum in standard sheets and ingots, and special alloys. Inespal was reformed into a new holding company with four operating subsidiaries: Aluminio Español, Inespal Extrusion, Inespal Conversion, and Inespal Productos Planos.

Freeport-McMoRan Copper and Gold Inc. of the United States, was undertaking an expansion of the Huelva copper complex to increase smelter capacity from 150,000 metric tons per year (t/yr) to 270,000 t/yr. The refinery also would be expanded to increase the production of copper cathodes from 135,000 t/yr to 215,000 t/yr. The overall smelter and refinery expansions were scheduled to be completed by 1997 at an estimated cost of $215 million.

The copper smelter was the second largest in Europe, and the complex was the only one in Spain that both transformed copper ore into raw copper and then refined the copper in an electrolysis plant.

RTZ Corp., of the United Kingdom, signed a letter of intent with Freeport-McMoRan to purchase a 25% interest in the Huelva operation. In addition, RTZ would acquire a 25% interest in Freeport-McMoRan's exploration program in Spain.

Almagrera S.A. announced the development of an open pit copper mine in the Province of Huelva. Reserves were estimated by the company to be 5 million metric tons (Mt) of ore averaging 3% copper with byproduct zinc. The project,

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consisting of the mine, equipment, access roads, and processing plant, was estimated to cost $22 million.

The company reported extraction of 247,000 metric tons (t) at the Migollas Mine with grades of 4.21% copper, 0.59% lead, and 1.2% zinc. Almagera also announced that, from 1995 onward, it planned to produce 377,000 t/yr of complex ore and 400,00 t/yr of copper bearing ore from its conibined operations at Migollas and Sotiel Mines.

Navan Resources PLC of Ireland and Tolsa S.A. of Spain were a joint-venture gold exploration project in the Almería Province of southern Spain. Navan, with 80% interest, was participating as operator in the exploration of a 150-square-kilometer (km^2) area. Concorde Minera S.A. was conducting investigations in the Province of Almería on the Nijar reserve, on behalf of the state. Concorde also was carrying out exploratory work in the Asturias area.

Compañia Andaluza de Minas S.A. (CAM) was the largest iron ore producer in Spain. The open pit operation produces about 3.3 Mt/yr from the Alquife deposit on the north side of the Sierra Nevada, approximately 80 km from Grenada. Iron ore mining in Spain was located almost totally at Alquife. Also, CAM operated a 90,000-dry- weight-ton-capacity shiploader at the Port of Almeira.

The Spanish steel industry maintained its efforts to adapt to the economic environment and realities of the Common Market in Europe. The industry was completely integrated into the EU except for some issues, such as an EU Commission request for a reduction in steelmaking capacity. This restructuring effort was expected to reduce Spanish steel capacity by 1.3 Mt with 10,000 jobs expected to be lost.

Corporacion de la Siderurgia Integral (CSI) and Sidenor were the two state companies that produced 50% of the country's steel, while 13 companies were in the private sector. A majority of these were scrap-based minimills. CSI was composed of Spain's two largest integrated steel producers, Empresa Nacional Siderurgia S.A. and Altos Hornos de Viscaya. CSI was charged with developing the future strategy of the two companies to reduce production costs and improve productivity.

Outokumpu Minera Española S.A. was doing exploration work on lead and zinc in the Cantabria, León, and Huelva areas. Also, Austriana de Zinc, at Reocín, and Navan Ltd., at Mazarrón, were carrying out investigations.

Spain was the only mercury producer in the EU in 1995. Work continued on Minas de Almadén y Arrayanes S.A.'s (MAYASA) Las Cuvas Mine at Almadén, in southern Spain. The new mine, which began limited production in 1995, contained estimated reserves of 140,000 t of ore at a grade of 5% mercury.

Asturiana de Zinc S.A. was the largest refined zinc producer in the EU and accounted for approximately 4% of the world's zinc production. Asturiana's San Juan de Nieva smelter had a capacity of 320,000 t/yr. The company's Reocín Mine and Exminesa's Rubiales Mine supplied most of the feed concentrates. Asturiana was investigating areas near the Reocin Mine attempting to develop additional reserves.

It was reported that a large number of civil construction projects were awaiting tenders, which would indicate a positive area for growth. Cementos Mexicanos S.A. purchased Valenciana de Cementos S.A., one of the country's largest producers, for an estimated $1.7 billion. This represented the largest and first really significant acquisition in Spain by a North American cement producer.

Kaolin deposits occur in two different geological environments in Spain. One is a hydrothermal alteration of Pre-Hercynian granites in the northwestern part of Spain. The other source in eastern Spain was derived from the weathering of crystalline rocks of Lower Cretaceous age. These two areas in the country were estimated to have produced more than 400,000 t/yr of kaolin and have resulted in Spain becoming one of the more important kaolin producers in western Europe.

Explotaciones Ceramicas Españolas S.A. (ECESA) and 3Caolines de Vimianzo S.A. (CAVASA) are two of the largest kaolin producers in Spain. ECESA produced about 90,000 t/yr from its operations at Burela de Cabo, Lugo Province, and CAVASA produced about 100,000 t/yr from its operations at Vimianzo, Cap Finisterre, and Galicia Province. Both companies produced ceramic, fiberglass, and paper-grade kaolin. ECESA also produced a range of kaolins for porcelain and earthenware.

Spain was the world's largest producer of slate, and, along with Greece, Italy, and Portugal, provided a significant volume of the world's supply of granite and marble. Increased infrastructure construction led to a growing importance of aggregates, and the ornamental rock sector continued to enjoy a steady demand.

The dominant lime producer was Calcinor S.A. and its numerous associates. Together, these producers have a capacity approaching 600,000 t/yr of burnt lime. Other producers included Tuledas Asturias S.A., which produced about 1,000 t/d exclusively for the steel industry, and Calcopu S.A., which produced lime used in the mining and production of copper, iron, steel, and building materials.

Minera San Albin S.A. (SMSA) was conducting exploration drilling on the Alto Eugenia Hill wollastonite deposit in Colmenar Viejo. SMSA estimated that 3.5 Mt of calcite-garnet-wollastonite ore had been delineated, with an estimated wollastonite content of 900,000 t.

Plans to develop the project reportedly ran into difficulty with the local community. The people of Colmenar Viejo were against the project owing to its being perceived as a potential hazard to local water supplies and its close proximity to the Virgen de los Remedios hermitage, which was attracting tourists.

Desarrollo de Recursos Geologicos (DRG) carried out an exploration program on its Illustacion wollastonite project near the Spain-Portugal border. The company reported that it had defined a deposit greater than 20 Mt in size with an average grade of 35% wollastonite. DRG was looking for a joint-venture partner to participate in the project. Other than in Finland, little or no natural wollastonite was produced in Europe.

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Spain is endowed with reserves of anthracite and bituminous coal and lignite, and was the third largest anthracite-bituminous coal producer in the EU. In the past, domestic production had provided the coal requirements of the power generation industries. About 97% of the coal produced was consumed domestically in thermoelectric plants.

About one-third of Spain's coal needs was imported, and future plans called for increased coal usage in the electric generating industry. More coal was expected to be imported because Spanish coal, particularly lignite, has a high sulfur content. Imported coal, mainly from South Africa, comprised about 15% of consumption and was expected to reach 30% by the end of this century. Compliance with environmental legislation would require significant investments by most companies to utilize domestic lignite in operations.

The number one coal producer was the Government-owned company Hulleras del Norte S.A.(Hunosa), and the number one lignite producer was the 65% Government-owned company Empressa Nacional de Electricidad S.A.(Endesa). The Government-owned company Empresa Nacional Carbonifera del Sur S.A. (Encasur), also produced coal. The largest private sector coal producer was Sociedad Hullera Vasco Leonesa.

Under its Future Plan, Hunosa was reducing output, closing less profitable mines, concentrating on the most profitable deposits, and reducing its payroll in an attempt to lower its production costs. Endesa started up its new Corta Gargello open pit mine in Andorra. Encasur's two new open pit mines, Espiel and Cabeza de Vaca, were operational in 1995.

The EU and the Government were negotiating the future of the coal industry of Spain. The EU maintained that Spain should close at least one-half of its mines because the cost of national coal was often as much as six times the price of imported coal. Coal production in Spain was considered by the EU to be inefficient because the cost of coal at yearend was $253 t as compared with the average price of EU coal of about $77 t.

The Government maintained that, while coal reserves are abundant, mining conditions were difficult because of narrow seams of coal with many faults and a high ash content. Therefore, coal was more expensive than that imported from Poland or South Africa. This issue was not expected to be resolved quickly.

The energy contribution of domestic natural gas historically had been small, contributing only 3% of the country's energy requirements. The Spanish Government's National Energy Plan (PEN) has indicated that natural gas was expected to furnish 5% of Spain's energy requirements in the 1990's. There have been significant gas discoveries, and the country has embarked on a drilling program to bring these resources to market. The Gaviota Field in the Cantabrian Sea and the Marisma onshore field provided most of Spain's natural gas. It was estimated that these resources could provide about 2 billion cubic meters (m^3/yr) of natural gas per year.

A new pipeline would initially deliver 1.3 billion m^3/yr of natural gas from the Algerian gas fields via Morocco. This volume would reportedly increase to 2.8 billion m^3/yr by the late 1990's. The 2,000-km-long by 1.2 meter diameter pipeline, expected to be operational in late 1996, would cross the Strait of Gibraltar and enter Spain at a point still to be determined.

Spain had very little domestic crude petroleum production, which accounted for a small percentage of the country's requirements. Casablanca, an offshore oilfield, and Ayoluengo, an onshore field, were the only two producing fields. There has been little effort to discover new reserves since two U.S. companies, Amoco Inc. and Chevron Inc., withdrew from Spanish exploration in 1989.

Empressa Nacional del Uranio was proceeding with the construction of a uranium concentrate plant to increase capacity at Saelices el Chico in the Province of Salamanca. The capacity of the plant would be increased from the existing 254 t/yr to 950 t/yr of U_3O_8 and was expected to be in operation by yearend 1995. The project, estimated to cost $40 million, was being subsidized by the EU through the Salamanca Regional Development Organization.

The Spanish National Railways operated on 13,500 km of 1.668-m-gauge track and 1,820 km of 1-m-gauge track. This was different from the 1.435-m-gauge track used throughout most of Europe. Most of the 150,000 km of highways are paved. However, only a small portion are limited-access divided highways. Infrastructure improvements were one of the Government's priorities. The main ports are Barcelona, Bilboa, Cadiz, Cartagena, Gijon, Huelva, and Tarragona.

The mineral-resource base in Spain has not been fully exploited, and this mineral-resource-rich country was expected to continue to contribute these resources for the continued development of Spain and the EU. There was an appreciable amount of minerals exploration work being carried out in various areas.

Within the Pyrite Belt, the discovery of complex sulfide deposits at Aguas Teñidas, Conceptión, and Cerro Colorado have reached the stage of economic viability studies. The gold exploration program by Rio Narcea Gold Mines of Canada is probably the largest in Western Europe. It involves a total of 1,100 square kilometers of mining concessions and investigation permits located on the gold-bearing belts at Rio Narcea, Navelgas, Oscos, and Salave west of Asturias. Rio Narcea has acquired all the concessions and permits which belonged to the Spanish subsidiary of Anglo American Corp.

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TABLE 1
SPAIN: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity		1991	1992	1993	1994	1995 e/
METALS						
Aluminum:						
Bauxite		-- r/ e/	3,900	--	--	--
Alumina 2/		1,003,000	959,100	1,060,000	1,000,000	1,000,000
Metal:						
Primary		355,100	359,022	364,256	338,106	361,100 3/
Secondary		72,000 e/	96,500	99,700	98,000	103,500
Cadmium metal		344	361 r/	365 r/	387 r/	350
Copper:						
Mine output, Cu content		8,322	9,432	3,518	4,940	33,359 3/
Metal:						
Blister: e/						
Primary		111,100	110,000	135,800	141,600	134,300
Secondary		38,000	37,000	44,800	46,800	47,100
Total		149,100	147,000	180,600	188,400	181,400
Refined:						
Primary		124,900	134,325	180,600	141,600	117,100
Secondary		65,000	44,775	180,600	46,800	47,100
Total		189,900	179,100	361,200	188,400	164,200
Gold, mine output, Au content	kilograms	7,421	6,572	6,083	5,852	3,256 3/
Iron and steel:						
Iron ore and concentrates (including byproduct concentrate),						
Fe content	thousand tons	1,763	1,641	1,109	2,086	1,982 3/
Metal:						
Pig iron	do.	5,397	5,076	5,394	5,447	5,128
Ferroalloys, electric furnace	do.	150 e/	145 e/	117	70	125
Steel:						
Crude	do.	12,933	12,295	12,646	13,547	13,975
Castings and forgings	do.	170 e/	160 e/	165	175	175
Total		13,103 e/	12,455 e/	12,811	13,722	14,150
Semimanufactures	do.	10,991	10,753	11,563	12,103	12,000
Lead:						
Mine output, Pb content		44,385 e/	37,000	25,300	23,573	30,000
Metal: e/						
Primary		110,000	62,000	62,400	70,400	70,000
Secondary		59,000	58,000	61,000	75,000	85,000
Mercury: Metal	kilograms	52,000 r/ e/	-- r/ e/	64,300	393,000	1,497,000
Silver, mine output, Ag content	do.	182,000 r/ e/	191,000	192,418	195,754	200,000
Tantalum minerals (tin byproduct): e/						
Gross weight	do.	8,000	8,000	6,000	5,000	5,000
Ta content	do.	2,000	2,000	1,500	1,200	1,200
Tin:						
Mine output, Sn content		12	7	2	5	2
Metal, primary e/		1,670	2,230	2,000	2,000	2,000
Titanium dioxide e/		30,000	30,000	25,000	20,000	20,000
Uranium, mine output, U_3O_8 content		223	187	215	301	300
Zinc:						
Mine output, Zn content		261,300 r/ e/	204,655	170,200	150,422	172,000
Metal, primary and secondary		262,000 r/ e/	352,000	328,000	298,700	321,500
INDUSTRIAL MINERALS						
Barite		5,200 r/ e/	6,190	6,000 r/ e/	6,000	5,000
Bromine e/		300	250	200	200	200
Cement, hydraulic, other than natural	thousand tons	27,582	24,615	22,878	25,131	26,423 3/
Clays:						
Attapulgite e/		72,900	87,300	85,000	85,000	80,000
Bentonite e/		150,000	150,000	150,000	150,000	150,000
Kaolin, washed		413,000	305,000	148,000	290,000	300,000
Other e/	thousand tons	10,000	10,000	13,000	13,650	25,300

See footnotes at end of table.

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TABLE 1--Continued
SPAIN: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity		1991	1992	1993	1994	1995 e/
INDUSTRIAL MINERALS--Continued						
Diatomite and tripoli		60,000	36,000	38,000	40,000	40,000
Feldspar		214,000	247,000	239,000	250,000	225,000
Fluorspar:						
Acid-grade		107,000	94,000	82,000	97,000	96,000
Metallurgical-grade		5,000 e/	2,960	5,000	10,000	15,000
Total		112,000 e/	96,960 e/	87,000	107,000	111,000
Gypsum and anhydrite, crude	thousand tons	7,210	6,760 r/	7,250	7,300	7,500
Kyanite, andalusite, related materials e/		3,600	3,600	3,000	3,500	3,500
Lime, hydrated and quicklime e/	thousand tons	1,200	1,200	1,200	1,000	1,000
Magnesite:						
Calcined		136,000 e/	133,032	131,000	135,000	150,000
Crude		445,000 e/	400,000 e/	400,000	400,000	400,000
Mica		300 e/	250 e/	250	250	200
Nitrogen, N content of ammonia	thousand tons	557	479	354	360	400
Pigments, mineral: e/						
Other		8,600	7,910	8,000	8,000	7,000
Red iron oxide		20,000	18,000	16,000	16,000	15,000
Potash, K_2O equivalent		585,200 r/	593,605	660,900	683,700	680,000
Pumice e/		800,000	800,000	700,000	700,000	700,000
Pyrite, including cuprous, gross weight	thousand tons	1,358	862	722	746	750
Salt:						
Rock, including byproduct from potash works	do.	3,172	2,710	2,510	2,850	2,800
Marine and other	do.	900 e/	965	900	850	900
Sand and gravel, silica sand e/ 4/	do.	2,200	2,180	2,200	2,000	2,000
Sepiolite		392,000 e/	400,000 e/	400,000	375,000	375,000
Sodium compounds, n.e.s.:						
Soda ash, manufactured	thousand tons	500 e/	500 e/	500	500	500
Sulfate: Natural						
Glauberite, Na_2SO_4 content		450,000 e/	482,000	260,000 e/	350,000	350,000
Thenardite, Na_2SO_4 content		250,000 e/	189,000	158,000 e/	250,000	250,000
Manufactured e/		150,000	150,000	150,000	150,000	150,000
Stone: Calcareous e/						
Chalk	thousand tons	400	659	500 e/	400	500
Dolomite	do.	4,000	4,380	4,500	4,400	4,500
Limestone	do.	115,000	175,000	160,000	145,600	36,500
Marble	do.	2,210	1,990	2,130	2,132	2,370
Marl	do.	5,000	3,960	4,000	4,000	4,000
Basalt	do.	2,500	3,000	4,480	4,500	4,500
Granite	do.	1,150	980	1,170	1,338	1,380
Ophite	do.	2,000	1,750	2,500	3,000	2,500
Phonolite	do.	750	700	500	500	500
Porphyry	do.	700	958	500	500	500
Quartz	do.	900	991	1,600	1,500	1,500
Quartzite	do.	700	1,332	1,000	1,000	1,000
Sandstone	do.	1,800	1,700	1,600	1,500	1,500
Serpentine	do.	400	811	400	400	400
Other	do.	30,000	30,000	30,000	30,000	30,000
Strontium minerals: e/						
Gross weight		75,000	65,000	50,000	50,000	50,000
Sr_2O_4 content		29,000	18,000	12,000	12,000	12,000
Sulfur:						
S content of pyrites	thousand tons	546	406	327	350	350
Byproduct: e/						
Of metallurgy	do.	252	258	250	250	250
Of petroleum	do.	105	90	100	100	100
Of coal (lignite) gasification	do.	2	2	2	2	2
Total e/	do.	905	756	679	702	700
Talc and steatite e/		70,000	70,000	65,000	65,000	65,000

See footnotes at end of table.

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TABLE 1--Continued
SPAIN: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity		1991	1992	1993	1994	1995 e/
MINERAL FUELS AND RELATED MATERIALS						
Coal (marketable):						
Anthracite	thousand tons	5,640	6,180	6,050	6,000	6,000
Bituminous	do.	15,500	12,400	13,300	12,000	12,000
Lignite	do.	19,600	18,700	17,457	15,499	14,807
Total	do.	40,740	37,280	36,807	33,499	32,807
Gas, natural (marketed)	million cubic meter	1,290	1,220	633	197	383
Peat e/		75,000	70,000	70,000	70,000	70,000
Petroleum:						
Crude	thousand 42-gallon barrels	7,620	7,818	6,376	5,879	4,900
Refinery products:						
Liquefied petroleum gas	do.	20,000 e/	21,541	18,600	19,848	20,000
Naphtha	do.	15,000 e/	22,040	19,600	19,006	18,000
Gasoline, motor	do.	80,000 e/	84,499	79,300	84,388	85,000
Jet fuel	do.	30,000 e/	25,899	24,500	29,192	30,000
Kerosene	do.	29,000 e/	26,404	25,100	29,249	30,000
Distillate fuel oil	do.	110,000 e/	122,128	114,000	121,695	120,000
Residual fuel oil	do.	92,000 e/	121,188	97,900	94,912	95,000
Other e/	do.	30,000	30,000	30,000	30,000	30,000
Refinery fuel and losses e/	do.	12,000	12,000	12,000	12,000	12,000
Total e/	do.	418,000	465,699	421,000	440,290	440,000

e/ Estimated. r/ Revised.
1/ Table includes data available through May 1996.
2/ Reflects aluminum hydrate.
3/ Reported figure.
4/ Includes sand obtained as a byproduct of feldspar and kaolin production.

TABLE 2
SPAIN: 1994 BALANCE OF PAYMENTS, SELECTED MINERAL COMMODITIES 1/

(Thousand dollars)

Mineral commodity	Exports to EU	Imports from EU	Net gain or (loss)	Exports to the world	Imports from the world	Net gain or (loss)
Crude industrial minerals:						
Feldspar	12,928	2,623	10,305	14,674	7,060	7,614
Magnesite	196	286	(90)	388	475	(87)
Slate	1,472	12	1,460	1,684	44	1,640
Other	181,149	136,673	44,476	277,057	368,404	(91,347)
Total	195,745	139,594	56,151	293,803	375,983	(82,180)
Metalliferous ores:						
Copper	21	20,191	(20,170)	3,689	365,903	(362,214)
Lead	4,253	5	4,248	6,147	119	6,028
Tin	--	78	(78)	--	749	(749)
Zinc	6,828	1,502	5,326	15,220	79,150	(63,930)
Other (including waste and scrap)	104,310	718,956	(614,646)	177,516	1,264,585	(1,087,069)
Total	115,412	740,732	(625,320)	202,572	1,710,506	(1,507,934)
Nonmetallic mineral manufactures	294,461	97,940	196,521	604,060	182,599	421,461
Metals:						
Iron and steel	1,682,099	1,902,037	(219,938)	3,173,507	2,350,435	823,072
Mercury	177	67	110	1,938	848	1,090
Other nonferrous metals	951,245	870,814	80,431	1,218,486	1,302,001	(83,515)
Total	2,633,521	2,772,918	(139,397)	4,393,931	3,653,284	740,647
Mineral fuels	720,401	984,819	(264,418)	1,583,641	8,661,077	(7,077,436)

1/Table prepared by Harold Willis, International Data Unit.

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TABLE 3
SPAIN: STRUCTURE OF THE MINERAL INDUSTRY OF 1995

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity
Alumina		Alumina Española S.A.	Alumina plant at San Ciprián, Lugo	1,000.
Aluminum		Aluminio Español S.A.	Electrolytic plant at San Ciprián, Lugo	180.
Do.		Industria Española del Aluminio, S.A.	Electrolytic plant at Avilés	100.
Do.		do.	Electorlytic plant at La Coruña	25.
Do.		Aluminio de Galicia S.A.	Electorlytic plant at Sabiñánigo	78.
Do.		do.	do.	14.
Coal:				
Anthracite		Antracitas Gaiztarro S.A.	Mines at María and Paulina	2,000.
Do.		Antracitas de Gillón S.A.	Mines near Oviedo	2,000.
Do.		Antracitas del Bierzo S.A.	Mines near León	1,000.
Bituminous		Hulleras del Norte S.A. (Hunosa)	Various mines and plant	3,300.
Do.		Hulleras Vasco Leonesa S.A.	Santa Lucia Mine, Leon	2,000.
Do.		Minas de Figaredo S.A.	Mines near Oviedo	1,000.
Do.		Nacional de Carbon del Sur (Encasur)	Rampa 3 and San Jose Mines, Cordoba	200.
Lignite		Empresa Nacional de Electricidad (Endesa)	As Pontes Mine, and Andorra Mine, La Coroña	15,000.
Barite		Minas de Baritina S.A. (Kali-Chemie of Germany, 100%)	Mine and plant in Espiel area, Córdoba	50.
Cement		Approximately 36 cement companies, of which the largest is-- Asland S.A.	54 plants, including 5 (Asland) plants, of which the largest ones are plants at Puerto de Sagunto, Valencia, and at Villaluenga de la Sagra, Toledo	44,000. (6,000). 2,000. 2,000.
Copper:				
Metal		Rio Tinto Minera S.A. (Freeport McMoRan Inc., 65%; Ercros Group, 35%)	Smelter at Huelva	85.
Do.		do.	Electrolytic refinery at Huelva	105.
Do.		Industrias Reunidas de Cobre	Smelter at Asua-Bilbao	30.
Do.		Electrolítico y Metales S.A.	Fire and electrolytic refinery at Asua-Bibao	36.
Ore		Rio Tinto Minera S.A. (Freeport McMoRan Inc., 65%, Ercros Group, 35%)	Mines and plant at Arientero, near Santiago de Compostela, Galicia	12.
Do.		do.	Corta Atalay opencast mine, Cerro Colorado opencast mine and plant, and Alfredo underground mine--all in Rio Tinto area	30.
Fluorspar, ore		Fluoruros S.A. (Bethelhem Steel Corp., 49%)	Plant at Caravia, near Colunga	400.
Do.		do.	Opencast mmines at San Lino and Val Negro, and underground mine at Eduardo, near Caravia--all in Asturias	350.
Do.		do.	Plant at Collada, Gijón Mines at Veneros Sur and Corona, Gijón	200.
Iron ore		Compañia Andaluza de Minas S.A.(Mokta, 62%)	Mine at Alquife, Granada	4,000.
Do.		Altos Hornos de Vizcaya S.A. (U.S. Steel, 25%)	Nine mines in Province of Vizcaya	4,000.
Do.		Compañia Minera Siderúgica de Ponferrada S.A.	Eight mines in Province of León	3,000.
Do.		Minera del Andévalo S.A.	Opencast mine at Coba, Huelba	2,000.
Lead:				
Metal		Sociedad Minera y Metalúrgica de Peñarroya de España, S.A. (Peñarroya, France, 98%)	Smelter at Cartagena, Murcia Refinery at Cartagena, Murcia	60. 60.
Do.		Compañia La Cruz, Minas y Fundaciones de Plomo S.A.	Smelter at Lineares, Jaén Refinery at Lineares, Jaén	40. 40.
Do.		Tudor S.A.	Secondary smelter at Saragoza	16.
Do.		Ferroaleaciones Españolas, S.A.	Secondary smelter at Medina del Campo	12.
Do		Derivados de Minerales y Metales	Secondary smelter at Barcelona	5.
Ore		Sociedad Minera y Metalúrgica de Peñarroya España S.A. (Peñarroya, France 90%)	Opencast mine at Montos de Los Azules, near Unión, Murcia	25.
Do.		Andaluza de Piritas S.A. (APIRSA)	Opencast mine at Aznalcóllar, Sevilla	21.
Do.		Exploración Minera International España S.A. (EXMINESA)	Underground mine at Rubiales, Lugo	16.
Magnesite		Magnesitas de Rubián S.A.	Plants at Zubiri	100.
Do.		do.	Mines and plant near Sarria, south of Lugo	220.
Mercury	flasks	Minas de Almadén y Arrayanes S.A., (Government 100%)	Mine and smelter at Almadén	70,000
Petroleum:				
Crude	barrels per day	Chevron S.A.	Oilfield at Casablanca	300.

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TABLE 3--Continued
SPAIN: STRUCTURE OF THE MINERAL INDUSTRY OF 1995

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity
Petroleum--Continued:				
Refined	barrels per day	Repsol Petróleo S.A.	Refineries at Escombreras	200,000.
Do.	do.	do.	Puertollano	14,000.
Do.	do.	do.	Tarragona	260,000.
Do.	do.	Refineria de Petróleos del Norte S.A. (Petronor)	Refinery at Somorrostro	240,000.
Do.	do.	Compañía Española de Petróleos S.A.	Refinery at Santa Cruz de Tenerife	160,000.
Do.	do.	Petroleos del Mediterraneo S.A. (Petromed)	Refinery at Castellón de la Plana	120,000.
Refined	barrels per day	Compañía Iberica Refinadora de Petróleos S.A. (Petroliber)	Refinery at La Coruña	140,000.
Potash, ore		Potasas de Navarra S.A.	Mines and plant near Pamplona	300.
Do.		Minas de Potasas de Suria S.A.	Mines at Suria	1,000
Do.		Unión Explosivos Rio Tinto S.A.	Mines at Balsareny/Sallent and Cardona	2,000
Pyrite		Compañia Española de Mines de Tharsis	Mines and plants at Tharsis and Zarza, near Seville	1,300.
Do.		do.	Plant at Huelva	600.
Do.		Rio Tinto Minera S.A. Unión Explosivos (Rio Tinto, 75%; Rio Tinto Zinc, 25%)	Mines and plant at Rio Tinto, near Seville	900.
Sepiolite		Tolsa S.A.	Mine and plant at Vicalvaro, near Toledo	100.
Do.		Silicatos-Anglo-Ingleses S.A.	Mine and plant at Villecas near Madrid	200.

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THE MINERAL INDUSTRY OF

SWEDEN

By Harold R. Newman

On January 1, 1995, Sweden acceded to the European Union (EU). In anticipation of this event, Sweden liberalized its mineral policy to parallel EU standards. The new policy, based on the Swedish Minerals Act, 1992, eliminated laws requiring foreign companies to get special permission for prospecting, annulled the State's participation in mining enterprises (so-called "crown shares"), and revoked all taxes and royalties, except for the normal 28% corporate tax, one of the lowest in Europe. Some industrial minerals will no longer be the property of the landowner.

Furthermore, an exploration permit holder will not automatically have the right to an exploitation permit. Adequate financial and technical capabilities must be proven. The State Mining Property Commission was closed and previous restrictions on real estate ownership were eliminated, thus allowing foreign participation in the mining of a wide range of minerals. Exploration interest was significant with a number of Australian, Canadian and European mining companies applying for permits.

Sweden is endowed with significant deposits of iron ore, certain base metals (copper, lead, and zinc), and several industrial minerals, including dolomite, feldspar, granite, ilmenite, kaolin, limestone, quartz, and wollastonite. The country is well known for the production of high-quality steel. Sweden relies heavily on hydrocarbon imports, due to inadequate indigenous resources; as a result, the country has developed substantial nuclear and hydroelectric power. *(See table 1.)*

The mineral industry accounted for about 13% of Sweden's exports, about one-third of which was steel. Because Sweden lacked a zinc smelter, most zinc ore and concentrate, one of the largest mineral exports, was shipped to Norway. The country imported most of the raw material required to operate its copper and lead smelter. *(See table 2.)*

Sweden has a high recycling rate (90%) for aluminum cans because of close cooperation between its producer of can stock (Finspong), the can manufacturer (PLM Fosie), the collection companies (Returpak and PLM Fosie), and the secondary smelters (Gotthard Aluminum and Finspong). Consequently, secondary aluminum production has increased significantly in the past few years.

Electrolux AB, Stockholm, announced it had shelved plans to sell its aluminum and metal working unit, Granges AB. Earlier, Electrolux said it intended to offer 90% of its shares in Granges to both local and international investors. Reportedly, the reason given was that market conditions had become unfavorable for a listing of Granges.

Trelleborg AS announced it plans to invest about $20 million in expanding ore production at Boliden Mineral's Petiknas Mine in northern Sweden. Polymetallic ore production would be increased from 365,000 t/yr to 500,000 t/yr. Ores mined at Petiknas include copper, gold, lead, silver, and zinc. The project was expected to be completed by 1997.

Western Europe's largest gold mine, Terra Mining AB's opencast Bjorkdal Mine, was processing about 1 million metric tons per year (Mt/yr) of ore which was yielding a little over 2 t/yr of gold. Terra applied for a new license to process 1.3 Mt/yr. Large scale processing was helping to keep production costs down. Because of dwindling reserves at the mine, an estimated 19 Mt of gold ore grading 3 grams per ton of ore, Terra was continuing its exploration activities.

The recovery in the world economy in 1995 stimulated demand for iron ore and steel, a situation which benefitted Luossavaara-Kiirunavaara AB (LKAB). The company operated at full capacity in 1995. The new concentration and pelletizing plants in Kiruna went onstream in early 1995. The new grate kiln-type pellet plant has a capacity of 4 Mt/yr. This increased LKAB's previous capability of 10.5 Mt/yr to 14.5 Mt/yr of pellets. The Kiruna mining complex consisted of three open pit mines, Kiirunavaara, Leveaniemi, and Luossavaara.

LKAB reported that most of the capital investment in 1995, $180 million, related to the Kiruna and Malmberget operations with construction of a new main level at the underground mine due to be operational in 1997, and final pelletizing expansion expenditures. Another big investment relates to the construction of a new harbor in Luleå, which was scheduled to be commissioned in October 1996.

Boliden Bergsoe AB's secondary lead smelter in Landskrona has become the center for recovery of lead batteries in the Nordic countries. In 1995, it smelted about 58,000 metric tons (t) of lead batteries. Combined with other lead scrap the smelter produced over 42,000 t of secondary lead.

Svenskt Stal AB (SSAB) is Scandinavia's leading manufacture of commercial steel. Most production consisted of steel sheets and plates, produced mainly in two SSAB subsidiaries: Oxelossund and Tunnplant. The SSAB

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Oxelosund AB complex consisted of a coking plant, blast furnaces, a steel mill, and a continuous casting line for slabs and heavy plate of up to 155 milimeters in thickness. The 2Mmt/a SSAB Tunnplant was an integrated steel company with a coking plant, blast furnaces, and continuous casting line for the manufacture of slab and heavy plate.

In midyear 1995, the Zinkgruvan Mine, the largest zinc mine in Sweden, operated by Ammeberg Mining AB, was sold by its owner, Union Miniere (UM) of Belgium, to North Mining Svenska AB, a subsidiary of the Australian company, North Limited. Most of the zinc and lead concentrates produced by Zinkgruvan were processed at UM's refineries. Divesture of Ammeberg Mining was reported by UM to be in line with its strategic objective to withdraw from zinc mining activities.

There has been extensive changes in ownership reported during the last 5 to 6 years in the industrial minerals area. This has been an expanding sector in Sweden and a significant number of deposits were owned or controlled by international owners.

Woxna Graphite AB has obtained the mining rights to four graphite deposits near Edsbyn, central Sweden.

Woxna announced it was planning to start production in January 1996 using a 140,000 t/yr capacity plant that was under construction. The initial estimated production would be 10,000 to 14,000 t/yr of flaky graphite with a carbon content of 94%.

Limestone occurs in layers of different geologic ages and is found throughout the country. About one-half of the industrial mineral value was contributed by limestone. A significant amount of limestone production was by Kalproduktion Storugns AB, owned by Nordkalk AB, a company within the Finnish Partek OY group.

The company mined about 2.8 Mt at Storugns on the Baltic island of Gotland. About 40% of this was consumed by the metallurgical industry while 30% ended up as burnt lime. Other uses included the chemical and sugar industries and environmental applications. About 55% of total production was exported.

Swedish peatland covers 6.4 Mha which is about 15% of the country's total land area. About 865,000 ha were considered suitable for commercial production. In 1995, almost 8,000 ha was in production, most of which was used for fuel: the remainder was used for agriculture. The 80% used for fuel purposes was mainly in cogeneration plants for electric power and district heating. Some local authorities and industrial enterprises used peat as fuel and produced an estimated 120 megawatts (MW) of power and 190 MW of heat.

Sweden has a well developed transportation system, especially in the southern part of the country. There were 97,400 kilometers (km) of highway and 12,000 km of railroads. About 65% of waterborne cargo was handled by the five biggest ports—Goteborg, Helsingborg, Lulea, Stockholm, and Malmo. Truck ferries have become an important form of transportation.

TABLE 1
SWEDEN: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity		1991	1992	1993	1994	1995 e/
METALS						
Aluminum metal:						
Primary		96,912	77,210	82,363	83,900	83,000
Secondary		22,200	16,500	19,000	33,000	30,000
Arsenic, trioxide, refined e/		2,500	--	--	--	--
Copper:						
Mine output, Cu content		81,650	89,145	88,909	79,384	83,600
Metal:						
Smelter:						
Primary		68,113	77,804	76,298	79,080	78,000
Secondary		29,437	20,596	22,102	19,620	20,000
Total		97,550	98,400	98,400	98,700	98,000
Refined:						
Primary		67,587	71,634	76,300	77,300	75,000
Secondary e/		29,000	30,000	22,486	25,750	75,000
Total		96,587	101,634	98,786	103,050	150,000
Gold:						
Mine output, Au content	kilograms	6,247	6,164	6,548	6,364	64,000
Metal, primary 2/	do.	6,856	5,366	7,278	7,998	7,800
Iron and steel:						
Iron ore concentrate and pellets:						
Gross weight	thousand tons	19,328	19,277	18,728	19,663	21,634

See footnotes at end of table.

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TABLE 1--Continued
SWEDEN: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity		1991	1992	1993	1994	1995 e/
METALS--Continued						
Iron and steel--Continued:						
Fe content	thousand tons	11,088	12,337	11,901	12,587	13,880
Pyrite, roasted	do.	462	500	500 e/	500 e/	500
Metal:						
Pig iron and sponge iron	do.	2,810	2,740	2,850 r/	3,040	3,020
Ferroalloys:						
Ferrochromium		120,884	133,300	127,543	134,076	130,000
Ferrosilicon		21,100	15,500	20,400	22,000	20,000
Total		141,984	148,800	147,943	156,076	150,000
Steel, crude	thousand tons	4,248	4,356	4,591	4,952	4,930
Semimanufactures, rolled e/	do.	4,000	4,000	4,000	4,000	4,000
Lead:						
Mine output, Pb content		91,127	106,657	111,709	112,787	100,000
Metal:						
Smelter: e/						
Primary:						
Crude		1,000	1,000	1,000	1,000	1,000
Refined		55,000	55,000	49,000	40,200	40,000
Total primary		56,000	56,000	50,000	41,200	41,000
Secondary		26,000	26,000	37,500	42,500	42,000
Total smelter		82,000	82,000	87,500	83,700	83,000
Refined:						
Primary		49,168	54,100	46,752	46,600	46,000
Secondary		38,835	37,100	37,764	36,000	36,000
Total refined		88,003	91,200	84,516	82,600	82,000
Molybdenum, oxide, roasted, Mo content		2,160	4,280	4,000 e/	4,000	4,000
Nickel, metal: e/						
Unwrought, secondary		244 3/	250	250	250	250
Primary		490 3/	500	500	500	500
Selenium, elemental, refined		23	32	50 e/	50 e/	50
Silver:						
Mine output, Ag content	kilograms	239,321	284,967	255,257	276,042	268,200
Metal, primary 2/	do.	293,632	269,755	293,700	295,000	290,000
Tin, metal:						
Unwrought		23	32	30	30	30
Alloy		1,240	1,000	1,040	1,100	1,100
Zinc, mine output, Zn content		161,170	171,539	168,617	159,858	160,000
INDUSTRIAL MINERALS						
Cement, hydraulic	thousand tons	2,400	2,290	2,200	2,300	2,500
Clays, kaolin e/		100	100	100	100	100
Feldspar, salable, crude and ground		32,900	34,600	30,000 e/	30,000 e/	30,000
Fertilizer, manufactured:						
Nitrogenous	thousand tons	403 r/	448	450 r/ e/	450 e/	450
Phosphatic	do.	92	3	10 r/ e/	10 e/	10
Mixed	do.	468	312	300 r/ e/	300 e/	300
Lime	do.	506	460	500 e/	500 e/	500
Olivine e/	do.	114 3/	120	120	120	120
Pyrite, gross weight	do.	89	37	--	--	--
Quartz	do.	11	5	5 r/ e/	5 e/	5
Sodium sulfate, synthetic e/	do.	100	100	100	100	100
Stone:						
Dimension, mostly unfinished:						
Granite	do.	91 r/	82	80 r/ e/	80 e/	80
Limestone	do.	12	2	5 r/ e/	5 e/	5
Slate	do.	23	22	20 e/	20 e/	20
Other	do.	25 r/	20	20 r/ e/	20 e/	20

See footnotes at end of table.

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TABLE 1--Continued
SWEDEN: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity		1991	1992	1993	1994	1995 e/
INDUSTRIAL MINERALS--Continued						
Stone--Continued:						
Crushed:						
Dolomite	thousand tons	450 r/	631	700 r/ e/	700 e/	700
Granite	do.	4,920	4,447	5,000 e/	5,000 e/	5,000
Limestone:						
For cement manufacture	do.	1,208	1,027	1,000 r/ e/	1,000 e/	1,000
For lime manufacture	do.	600	712	700 r/ e/	700 e/	700
For other construction and industrial	do.	1,922	1,560	1,500 r/ e/	1,500 e/	1,500
Chalk	do.	40	28	30 r/ e/	30 e/	30
For agricultural uses	do.	264	335	350 r/ e/	350 e/	350
For other uses	do.	88	78	100 e/	100 e/	100
Total	do.	4,122	3,740	3,680 e/	3,680 e/	3,590
Quartzite	do.	1,474	1,433	1,500 e/	1,500 e/	1,500
Sandstone e/	do.	50	50	50	50	50
Undifferentiated e/	do.	28,963 3/	30,000	30,000	30,000	30,000
Other	do.	715	749	700 e/	700 e/	700
Sulfur:						
S content of pyrite	do.	89 r/	53	40 e/	40	40
Byproduct: e/						
From metallurgy	do.	125	125	125	125	125
From petroleum	do.	40	40	40	40	40
Total e/	do.	254	218	205	205	205
Sulfuric acid, gross weight		928	900	1,000 e/	1,000	1,000
Talc, soapstone e/		19,159 3/	20,000 r/	20,000 r/	25,000	25,000
MINERAL FUELS AND RELATED MATERIALS						
Carbon black	thousand tons	26	24	25 e/	25 e/	25
Coal, anthracite and bituminous e/	do.	28 3/	30	30	30	30
Coke, metallurgical	do.	1,110	1,150	1,200 r/ e/	1,200 e/	1,200
Gas, manufactured:						
Coke oven gas	million cubic meters	514	545	500 e/	500 e/	500
Blast furnace gas	do.	4,330	4,200	4,000 r/ e/	4,000 e/	4,000
Peat: e/						250
Agricultural use	thousand tons	263 3/	260	250	250	250
Fuel	do.	1,400	1,400	1,400	1,400	1,400
Petroleum:						
Crude e/	thousand 42-gallon barrels	19 3/	20	20	20	20
Refinery products:						
Liquefied petroleum gas	do.	2,950	4,620	3,000 e/	3,000 e/	3,000
Naphtha	do.	226	-- r/	500 e/	500 e/	300
Gasoline, motor e/	do.	31,300 3/	31,500	31,500	31,500	32,000
Jet fuel e/	do.	2,390 3/	2,500	2,500	2,500	2,500
Kerosene e/	do.	38 3/	50	50	50	50
Distillate fuel oil e/	do.	80,700 3/	81,000	81,000	81,000	80,000
Residual fuel oil e/	do.	27,300 3/	28,000	28,000	28,000	28,000
Other e/	do.	4,000	4,000	4,000	4,000	4,000
Refinery fuel and losses e/	do.	10,000	10,000	10,000	10,000	10,000
Total e/	do.	222,865	227,020	225,765	230,765	226,635

e/ Estimated. r/ Revised.
1/ Table includes data available through June 1996.
2/ Includes only that recovered from indigenous ores excluding scrap.
3/ Reported figure.

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TABLE 2
SWEDEN: STRUCTURE OF THE MINERAL INDUSTRY FOR 1995

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity
Aluminum	Granges AB (Electrolux 100%)	Sundsvall smelter at Kubikenborg	98
Cement	Cementa AB (Euroc 100%)	Plants at Degerhamn, Skovde, and Slite	3,400
Copper:			
Ore, copper content	Boliden Mineral AB (Trelleborg AB 100%)	Mines at Aitik, Garpenberg, Kankberg, Kristineberg, Langdal, Petiknas, and Renstrom	68
Do.	Outokumpu Oy	Mine at Viscaria/Pahtohavare	22
Metal	Boliden Mineral AB (Trelleborg AB 100%)	Smelter and refinery at Ronnskar	100
Feldspar	Berglings Malm & Mineral AB (Omya GmbH)	Mines at Beckegruvan, Hojderna, and Limbergsbo	50
Do.	Forshammar Mineral AB (Omya GmbH)	Mines at Limberget and Riddarhyttan	30
Do.	Larsbo Kalk AB (Omya GmbH)	Mines at Glanshamar and Larsbo	20
Ferroalloys	Vargon Alloys AB	Plant at Vargon	175
Gold:			
Ore, gold content tons	Terra Mining AB (Norsk Hydro A/S 42%)	Bjorgdal Mine	3
Do.	Boliden Mineral AB (Trelleborg AB 100%)	Mines at Aitik, Akerberg, Kankberg, Kristineberg, Langdal, Petiknas, and Renstrom	2
Metal	Boliden Metals AB (Trelleborg AB 100%)	Smelter and refinery at Ronnskar	9
Iron ore	Luossavaara-Kiirunavaara AB (Government 98%)	Mines at Kiruna and Malmberget	28,500
Iron and steel	Svenskt Stal AB (Government 48%)	Steelworks at Lule, Oxelosund, and Domnarvet	3,500
Kyanite	Svenska Kyanite AB (Svenska Mineral 100%)	Quarry at Halskoberg	10
Lead:			
Ore, lead content	Boliden Mineral AB (Trelleborg AB 100%)	Mines at Garpenberg, Laisvall, Langdal, Petiknas, and Renstrom	110
Do.	Ammeberg Mining AB (Union Miniere)	Zinkgruvan Mine at Ammeberg	20
Metal	Boliden Metals AB (Trelleborg AB 100%)	Smelter and refinery at Ronnskar	115
Lime	Euroc Mineral AB	Plants at Limham, Koping, and Storugns	250
Do.	Svenska Mineral AB	Plants at Rattvik and Boda	250
Petroleum, refined barrels per day	Skandinaviska Raffinaderi AB	Refinery at Lysekil	210,000
Do.	BP Raffinaderi AB	Refinery at Goteborg	100,000
Do.	Shell Raffinaderi AB	Do.	82,000
Do.	AB Nynas Petroleum	Refineries at Goteborg, Malmo, and Nynashamn	54,000
Silver, metal tons	Boliden Metals AB (Trelleborg AB 100%)	Smelter and refinery at Ronnskar	300
Zinc, ore, zinc content	Boliden Mineral AB (Trelleborg AB 100%)	Mines at Garpenberg, Laisvall, and Langdal	112
Do.	Ammeberg Mining AB (Union Miniere)	Zinkgruvan Mine at Ammeberg	60

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THE MINERAL INDUSTRY OF

SWITZERLAND

By Harold R. Newman

TABLE 1
SWITZERLAND: PRODUCTION OF MINERAL COMMODITIES 1/

(Thousand metric tons unless otherwise specified)

Commodity 2/		1991	1992	1993	1994	1995 e/
METALS						
Aluminum:						
Primary	metric tons	65,877	52,148	36,439 r/	24,172	28,000
Secondary	do.	35,800	10,700	4,200 r/	--	--
Iron and steel:						
Pig iron		105 r/	110 r/	110 r/	110	100
Electric-furnace ferroalloys e/		5	5	5	5	5
Steel, crude		1,110 r/	1,240 r/	1,260 r/	800	1,000
Semimanufactures, rolled products e/		1,000	1,000	1,000	700	700
Lead, refined, secondary	metric tons	5,000	6,400	6,000 r/	6,350	6,400
INDUSTRIAL MINERALS						
Cement, hydraulic		4,700	4,260	4,000	4,000	4,000
Gypsum e/		352	324	299	298	300
Lime e/		40	30	40	40	
Nitrogen, N content of ammonia		33	31	28	30	30
Salt		250 e/	276	300	300	300
Sulfur, from petroleum refining	metric tons	4,000	3,160	3,000	3,000	3,000
MINERAL FUELS AND RELATED MATERIALS						
Petroleum refinery products:						
Liquefied petroleum gas	thousand 42-gallon barrels	2,260	1,990	2,000	2,000	2,000
Gasoline	do.	9,810	8,330	8,500	8,500	9,000
Jet fuel	do.	2,100	1,960	2,000	2,000	2,000
Distillate fuel oil	do.	10,200	9,540	9,500	9,500	10,000
Residual fuel oil	do.	6,180	5,520	5,500	5,500	6,000
Bitumen	do.	916	812	800	800	800
Refinery fuel and losses	do.	1,990	2,180	2,200	2,200	2,000
Total 3/	do.	33,456	30,332	30,500	30,500	31,800

e/ Estimated. r/ Revised.
1/ Table includes data available through May 1996.
2/ In addition to the commodities listed, a variety of crude construction materials (common clay, sand and gravel, and stone) were produced, but output was not reported, and available general information was inadequate to make reliable estimates of output levels.
3/ Total of listed products only.

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TABLE 2
SWITZERLAND: STRUCTURE OF THE MINERAL INDUSTRY FOR 1995

(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity
Aluminum	Alusuisse-Lonza Holding AG	Smelter at Stag	48
Cement	Bundr Cementwerke AG (Holderbank Management and Consulting Ltd. 100%)	Plant at Untervaz	700
Do.	Cementfabrik Holderbank AG	Plant at Rekingen	700
Lead, secondary	Metallum AG	Smelter at Pratteln	13
Refinery, petroleum billion barrels per day	Reffinerie du Sud-Ouest SA (Compagnie Francaise des Petroles 49% and British petroleum 49%)	Refinery at Collombey	40,000
Do.	Reffinerie de Cressier SA (Kninklijke Nederlandsche Petroleum Maatschappij NV 100%)	Refinery at Cressier	36,000
Salt	Zentralbureu des Vereins der Schweizerischen Rheinsalinen (Government 100	Saline at Schweizerhalle	350
Do.	La Societe des Mines (Canton of Vaud 100%)	Saline at Bex	50
Steel	Monteforno Acciaierie e Laminatoi SA (Von Roll Group 93.6%)	Plant at Bodio	380
Do.	Von Roll Group	Plant at Gerlafingen	370
Do.	Von Moss Sthal AG	Plant at Emmenbrucke	300

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THE MINERAL INDUSTRY OF

TAJIKISTAN

By Richard M. Levine

Nonferrous metals and precious metals production were the leading sectors of Tajikistan's mineral industry. Tajikistan mined antimony, bismuth, copper, gold, lead, mercury, molybdenum, silver, tungsten, and zinc and produced aluminum. Tajikistan also extracted industrial minerals and mineral fuels including coal, gas, oil, and uranium.

Tajikistan's resources include a wide range of metals and industrial minerals as well as mineral fuels. Metal resources include alunite, antimony, bauxite, bismuth, cadmium, copper, gold, iron, lead, manganese, mercury, molybdenum, nepheline syenite, nickel, rare metals, selenium, silver, strontium, tin, tungsten, and zinc. Nonmetallic resources include barite, boron, construction materials, dolomite, fluorspar, phosphates, precious and semiprecious stones, and salt. Resources of mineral fuels include coal, natural gas, oil shale, peat, petroleum, and uranium. Tajikistan contains one of the world's largest silver deposits, the Adrasmanskoye deposit, which the country hopes to develop with the aid of foreign investment. The country also has large antimony reserves with reportedly 9 of the FSU'S 34 antimony deposits in Tajikistan.

In 1995 Tajikistan's GDP was estimated to have decreased by 12% compared with 1994 and continued the trend of decreasing GDP. Decreases ranging from 11% to 29% were registered for the years between 1992 and 1995.

Economic difficulties were based in part on shortages of energy which caused numerous enterprises to stand idle for periods of time. The country has large undeveloped hydroelectric resources and natural gas reserves which could potentially serve as sources of domestic energy. Plans called for speeding construction of a new 1-billion-kilowatt-capacity powerplant in Tajikistan on the Vakhsh River, the first stage of which was scheduled to be commissioned in the year 2000.

The Tajik aluminum smelter, with a capacity of over 500,000 t/yr of primary aluminum, reportedly produced 230,000 t of aluminum in 1995 which was slightly below 1994 output of 236,500 t. The smelter relies on imported energy and raw materials, with the smelter having great difficulty in 1995 acquiring needed energy.

The Zeravshan gold mining joint venture in Tajikistan between the Government of Tajikistan and the United Kingdom's Nelson Gold was planned to be developed in three stages. Plans for the first stage called for expansion of two existing mines, the Jilau open pit and the Taror Mine. According to a report by Nelson Gold Corp. on July 31, 1995, Jilau contains proven and indicated reserves of 28.3 (Mt) of ore averaging 1.43 grams of gold per metric ton (g/t) and containing 40.5 t (1.3 million ounces) of gold as well as inferred reserves of 42.1 Mt of ore grading 1.03 g/t and containing about 43.4 t (1.4 million ounces) of gold. Taror reportedly contains proven and indicated reserves of 12.5 Mt of ore averaging 6.78 g/t of gold and containing about 84.8 t (2.7 million ounces) of gold.

The first stage of development includes the construction of a carbon-in-leach plant with a 700,000 t/yr capacity planned for commissioning in the first quarter of 1996. The joint-venture agreement also calls for Nelson to explore areas around the Zeravshan project. Nelson has identified five targets in an area around the project.

In stage two, Nelson plans to construct a heap-leach operation adjacent to the Jilau pit. Phase three calls for completion of the Taror underground mine. Total output from Zeravshan is projected to be over 300,000 ounces per year from the fourth quarter of 1998 through 2005, with some projections calling for output to increase to between 400,000 to 500,000 ounces per year by 2002. The International Finance Corp. joined the project in an advisory capacity.

Despite the problems of recent civil warfare and the concomitant issues of economic and political stability, Tajikistan has succeeded in attracting investment in its gold-mining industry. Besides the Zeravshan project, Tajikistan has agreements with the United Kingdom's Gold and Minerals Excavation to explore for gold in the southern region of the Darvaz mountain range and Canada's Gulf International Minerals to explore and develop gold and silver deposits in the Karmazarsk region. In addition, the Government was negotiating other gold exploration, mining, and processing projects with companies from Canada, the United Kingdom, and the United States. Also, the country retains a large-aluminum producing industry that is both trading with and being supplied by western firms. Investment in these mineral industries and the development of other mineral industries could provide for increased revenues from Tajikistan's mineral sector.

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Despite Tajikistan's variety of mineral resources, Tajikistan's distant location from world markets and major transport arteries result in transport and infrastructure development costs being major factors in assessing the viability of mineral development in Tajikistan.

OTHER SOURCES OF INFORMATION

State Industry Committee of Tajikistan
c/o Representative Office (Moscow)
Raspletina 5
Moscow, Russia
Telephone: 7 095 946 9913/9805, Fax: 7 095 946 9913

TABLE 1
TAJIKISTAN: STRUCTURE OF THE MINERAL INDUSTRY FOR 1995

(Metric tons unless otherwise specified)

Commodity	Major operating companies	Location of main facilities	Annual capacity e/
Aluminum	Tajik aluminum plant	Tursunzade	500,000.
Antimony	Anzob mining and beneficiation complex	Dzhizhikrutskoye deposit	2,000.
Bismuth, metal	Leninabad mining and beneficiation complex	Yuzhno-Yangikanskiy deposit	25.
Do.	Isfara hydrometallurgical plant	Isfara	
Coal	Shurabskoye brown coal	Shurab region	300,000 total.
Do.	Fan-Yagnobskoye hard coal, deposits	Pyandzh region	
Copper	Leninabad mining and beneficiation complex	Yuzhno-Yangikanskiy deposit	NA.
Gold	Tajikzoloto mining-beneficiation complex, Pamir Artel	Darvazy, Rankul placer deposits placers in central and southern part of country	3.
Lead	Leninabad mining and metallurgical complex	Yuzhno-Yangikanskiy deposit	2,500.
Mercury	Anzob mining and beneficiation complex	Dzhizhikrutskoye deposit	150.
Molybdenum	Leinabad mining and beneficiation complex	Yuzhno-Yangikanskiy deposit	NA.
Petroleum and natural gas	16 oil-gas deposits under exploration, including: Ravatskoye, Ayritanskoye, Madaniyatskoye	Fergana depression	100,000 (petroleum). 100,000,000 cubic meter (natural gas).
Do	Shaambary Beshtentyakskoye, Uzunkhorskoye, Kichik-Bel-skoye	Southern Tajik depression	
Zinc	Leninabad mining and beneficiation complex	Yuzho-Yangikanskiy deposit	NA.

e/Estimated. NA Not available.

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THE MINERAL INDUSTRY OF

TURKMENISTAN

By Richard M. Levine

The mineral industry of Turkmenistan is based primarily on the extraction of natural gas with production also of oil and a number of important industrial minerals, including clays, construction materials, gypsum, iodine and bromine, sodium compounds and sodium sulfate, sulfur and table salt. Turkmenistan's most important reserves are of natural gas, oil, and industrial minerals, including barite, bentonite, bromine, iodine, sodium compounds, and sulfur. Oil reserves are primarily along the Caspian Sea coast, while gas reserves are along the Caspian coast and in the northern and eastern parts of the country. Following Russia, Turkmenistan was the second largest producer of natural gas among the republics of the FSU.

The GDP of Turkmenistan was estimated to have fallen 5% in 1995 compared with 1994, which was less than the 20% drop experienced in 1994 and 10% drop experienced in 1993. Turkmenistan has been one of the slowest of the countries of the FSU to adopt market economy reforms. At yearend 1995, privatization only had occurred in the consumer services, public catering, and small-scale retail trade sectors. Although a large exporter of natural gas to countries of the Commonwealth of Independent States (CIS), these countries were often greatly in arrears in paying for the gas, and often paid in barter with goods of dubious utility rather than hard currency.

In 1995, Turkmenistan's natural gas production fell by 10% compared with 1994 to 32.3 billion m^3 with the decrease resulting in large measure because of the inability of its customers to pay for the gas. Oil production in Turkmenistan in 1995 increased by 5% compared with 1994 to 4.7 Mt.

Russia and Turkmenistan agreed to form a joint-venture enterprise, Turkmenrosgaz, that will be responsible for conducting all mutual settlements for gas deliveries to CIS countries. Based on this new cooperation with Russia, which includes Russia promising to purchase 10 billion m^3 of gas in 1996, Turkmenistan plans to increase production of natural gas to 48 billion m^3 in 1996.

In 1996, Turkmenistan again will be a major supplier of natural gas to countries of the FSU. Taking into consideration that many of these countries are not able to fully pay for this fuel, Turkmenistan agreed to receiving 40% of the payments in freely convertible currency and 60% in barter.

Because Turkmenistan's only route for exporting its gas was through Russia, Russia had insisted that Turkmenistan supply other CIS countries with gas. Turkmenistan had been seeking to construct an alternate pipeline route for exporting its natural gas that would bypass Russia, but has not succeeded in acquiring financing to accomplish this. A plan formulated in 1994 called for construction of a Turkmenistan-Turkey-Europe gas pipeline that would transverse Iran. The pipeline could transport 28 billion cubic meters per year of gas, from which 15 billion m^3 would go to Turkey and 13 billion m^3 to Europe, but this plan has yet to achieve financing. Other plans under consideration include a pipeline to Pakistan via Afghanistan, a route through Central Asia to China, a route through the Caspian Sea, Azerbaijan, and Georgia to Turkey, and a similar route through Russia and Georgia over existing pipelines.

Turkmenistan was making plans to develop its own metals-producing industries. Based on domestic bauxite reserves, Turkmenistan is planning to construct alumina and aluminum plants and was soliciting foreign investment for this purpose. In 1995, Tukmenistan began construction of its first steel mill that is designed to produce up to 400,000 t/yr of rolled steel. It will be fed mainly by scrap bought outside of Turkmenistan. Turkish construction firms have been awarded contracts to assist in the construction of the new steel mill, which will considerably reduce Turkmenistan's dependence on imported steel.

Turkmenistan's industrial minerals industry is largely administered by the Ministry of Energetics and Industry. Some of the larger industrial minerals plants are: the Turkmenmineral Industrial Association that has the capacity to produce among other things over 200,000 t/yr of native sulfur from the Gaourdak deposit; the Nebit Dag Iodine plant with the capacity to produce among other things 265 t/yr of iodine from the thermal stratum waters of the Nesbitdag-Monjoukley deposit; the Cheleken Chemical plant with the capacity to produce among other things 355 t/yr of iodine from the thermal stratum waters of the Cheleken deposit; and the Karabogaz Sulfate Association with the capacity to produce among other things 400,000 t/yr of sodium sulfate; 100,000 t/yr of bischofite; 35,000 t/yr of epsomite; and 10,000 t/yr of Glauber's salt from buried brines in the Karabogaz Sulfate Bay off the Caspian Sea. Enterprises of the Ministry of Energetics and Industry also produce a range of chemical compounds made from iodine and fertilizer and fertilizer materials including ammonia, ammonia nitrate, nitric acid, superphosphate, sulfuric acid, and urea.

Turkmenistan was planning to further develop its

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industrial minerals industry and was seeking foreign investment for a range of projects including: development of capacity to produce bentonite, boron compounds, soda ash and caustic soda, cement, iodine and bromine and their compounds, lithium chemicals, metallic magnesium and magnesium compounds, potassium fertilizers, strontium chemicals, and table salt.

Owing to its large reserves of natural gas, Turkmenistan could be able to derive significant revenues from natural gas if it succeeds in establishing a pipeline network whereby it can transport this gas freely to world markets. Turkmenistan also has large reserves of certain industrial minerals including sodium compounds. These reserves will have to be examined in terms of economically marketing them on world markets and also in terms of marketing them in the FSU, particularly when consumption begins to increase in the FSU.

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Ministry of Energetics and Industry
Nourberdy Pomma St., 6
Ashgabat, Turkmenistan 744000
Telephone: 35-38-70/25-49/21/51-17-06
Fax: 39-06-82/51-05-51

Ministry of Construction Materials
Ashgabat, Turkmenistan

Ministry of Oil and Gas
28 Gogolia St.
Ashgabat, Turkmenistan
Telephone: 7-3632-29-38-27
Fax: 7-3632-51-04-43

Ministry of Foreign Economic Relations
92 Kemine St.
Ashgabat, Turkmenistan
Telephone: 7-3632-29-75-11/7-3632-29-75-24

Turkmenistan Geological Department
"Production Association (PO) Turkmengeologiya"
50 Years of Turkmenistan St., 7/32
Ashgabat, 744000, Turkmenistan
Telephone: 25-43-86/25-46-72
Fax:25-50-15

TABLE 1
TURKMENISTAN: STRUCTURE OF THE MINERAL INDUSTRY FOR 1995

(Thousand metric tons unless otherwise specified)

Commodity		Major operating company	Location of main facilities	Annual capacity e/	
Ammonia		Maryzaot Association	Mary region	400,000	1/
Bentonite		Oglany Mine	Oglany region	100,000.	1/
Cement		Byuzmein cement plant	Byuzmein	1,000,000	1/
Gypsum		IA Turkmenmineral	Mukry, Tagorin deposits	300,000	1/
Do.		Wastes from Gaourdak sulfur deposit	Gaourdak	400,000.	1/
Iodine and bromine		Cheleken plant	Cheleken region	355 (iodine).	1/
				4,740 (bromine	1/
		Nebit Dag plant	Vyshka	255 (iodine).	1/
				2,370 (bromine	1/
Natural gas	billion cubic meters	Deposits: Achakskoye, Gygyrlinskoye, East and West Shatlykskiye, North and South Naipskiye, Dauletabad-Donmezskoye	Northeastern, eastern southeastern, and southwestern part of country	90 total.	
Petroleum:		Deposits:			
Crude		Nebitdag, Cheleken, Kum Dag, Koturtepinskoye, Barsa-Gelmesskoye, Burunskoye, Kuydzhikskoye, Gograndagskoye, Okaremskoye, Kamyshldzhinskoye	Southwestern part of country on Caspian Sea	5,500,000 total.	
Refined		Chardzhou refinery	Chardzhou	6,000,000.	
		Krasnovodsk refinery	Krasnovodsk	5,000,000.	
Sodium sulfate		Karabogaz Sulfate Association	Bekdassh	400,000	1/
Sulfur		IA Turkmenmineral	Gaourdak deposit	240,000	1/

e/ Estimated. NA Not estimated.
1/ Reported number

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THE MINERAL INDUSTRY OF

UKRAINE

By Richard M. Levine

Ukraine continued to be a major producer of coal, ilmenite, iron ore, manganese ore, steel, and ferroalloys. Also, the country was a lesser producer of a number of other mineral products, including alumina, aluminum, cadmium, germanium, rutile-zirconium ores, secondary lead, mercury, nickel in ferronickel, magnesium, titanium metal and pigment, uranium ore, secondary zinc, and a large number of industrial minerals, including dolomite, graphite, kaolin, limestone fluxes, potash, quartz, salt, soda ash, and a variety of building materials.

In 1995, Ukraine reported a 12% decrease in gross domestic product compared with 1994 with a 13.5% decline in industrial output. In an organizational change, the Government made the former State Committee for Rare and Precious Metals a part of the Ministry of Industry. The Ministry of Industry was responsible for Ukraine's mining and metallurgical sector. Additionally, the Government of Ukraine promulgated and, in late 1994, adopted a new code on mineral resources. The code stipulated that Ukraine's mineral wealth belongs to the state and was not subject to purchase through private means. Private investors, however, could acquire a 99-year concession to develop mineral properties. The code provided for the State's right to inventory the country's mineral wealth, which was to be done by the State Committee on Geology and Utilization of Mineral Resources. Moreover, the code also sanctioned this committee to assign licenses for exploration, survey, and exploitation of mineral deposits by mining and mineral companies, organizations, and/or entities.

In 1995, enterprises in the metallurgical and chemical sectors were operating at only 40% to 50% of capacity owing to a loss of former domestic and former Soviet Union (FSU) markets, which necessitated that these industries seek new foreign markets. According to Ukraine's Minister of Industry, its mining and metals industries were in a critical state. In 1995, compared with that of 1990, output of iron and steel fell by 60% and of fuels by 58%.

The country's mineral industries required substantial capital investment to renovate and upgrade existing facilities. In steelmaking, 55% of production was from open-hearth furnaces, 43.5% from oxygen converter furnaces, and the remainder electric arc. Contiuous casting accounted for 12% of steel production.

Production of crude steel and pig iron in 1995 reportedly decreased compared with 1994 by about 3% and 6% respectively, while production of marketable manganese ore increased by about 7%. A program drawn up by the Government for the renovation of the mining and metallurgical sector up to the year 2010 called for shutting uneconomic enterprises and upgrading capacity at key ferrous metallurgical enterprises including the Azovstal steel mill, the Dneprospetstal electrometallurgical plant, the Krivoy Rog steel mill, the Makeevka metallurgical complex, the Nizhnedneprovsk pipe mill, and the Zaporozhstal steel mill. Plans called for increasing production of rolled steel to 20 million metric tons per year (Mt/yr) by the year 2000 and to 25 Mt/yr by 2010. Plans called for investment funds to come from the enterprises, the Government, and foreign entities. Also, plans for 1996 called for privatization of a number of major enterprises, including large steel mills, with the participation of foreign investors.

According to the Soviet Mining Encyclopedia, Volume V, 1991, Ukraine has 26.85 billion metric tons (t) of "balansovye" iron ore reserves, which according to the Soviet reserve classification system used by Ukraine are the economically exploitable portion of the reserves in categories A, B, C_1, and C_2. The Soviet reserve classification system, however, is not comparable to systems used in market economy countries as it did not apply market economy criteria in assessing reserves as having to be profitable in existing market conditions usimg existing technology. In addition to the balansovye reserves, the Ukrainian State Fund of Geological Information (Geoinform) reported that the country had significant potential to increase iron ore reserves based on prognosticated resources which are the undiscovered resources in categories P_1, P_2, and P_3 of the Soviet reserve classification system. (For an explanation of the Soviet reserve classification system, refer to the Russia chapter of the 1996 U.S. Geological Survey's Minerals Yearbook).

Iron ore production which was centered in the Krivoy Rog basin had decreased considerably since the late 1980's and mines were working at less than one-half capacity of about 125 Mt/yt of marketable iron ore. The iron content of direct shipping ore averaged 58% and the iron content of concentrate averaged 65%. There were six open pit mining and beneficiation complexes in operation and four underground mining complexes. Approximately 75% of the output was from open pits and the remaining 25% from underground mines.

Ukraine, according to the journal Mineral'ni Resursi Ukraini, Kiev, February 1995, page 5, published by Geoinform, based on the Soviet reserve classification system possesses the world's second largest proven reserves of manganese after South Africa, amounting to almost 2.5 billion t of ore. Proven reserves according to the Soviet

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reserve classification system are all reserves in categories A, B, and C_1. The country's principal reserves of manganese ore were found at the Nikopol and Bolshoy Tokmak deposits. In past years, the output of easily beneficiated oxide and oxide-carbonate manganese ores comprised between 85% and 98% of the Ukraine's annual production of up to 17 million tons of crude manganese ore. Currently, the oxide ores amount to less than 25% of the country's "balansovye" reserves of manganese ore which reportedly should be sufficient to last 20 years.

Ukaine's two major manganese mining and beneficiation complexes, the Marganets and Ordzhonikidze, reportedly were both being privatized in 1995. Mining reportedly was halted at the experimental Tavrichesky complex exploiting the Bolshoy Tokmak deposit owing to low manganese yields from the ore. Also, increases in the cost of electricity were causing output to fall at the Nikopol and Zaporozhye ferroalloys plant that were major producers of manganese ferroalloys.

Additionally, Ukraine reported having undeveloped chromite resources associated with ultra-basic massifs in the central Pobuzh region. The prognosticated chromite resources in this region reportedly amount to 2.6 Mt (Cr_2O_3 basis). Plans call for developing the Kapitanovskoye chromite deposit to supply domestic industry.

Despite the declining economic indicators and the decrease in output of major ferrous metals and coal during the first half of the 1990's, Ukraine during this same period experienced increased production of nonferrous metals. Plans for the mining and metallurgical sectors to the year 2010 envisaged some growth in ferrous metals output. However, the output of all ferrous metals by the year 2010 was still planned to be below the 1990 production level. Although no officially reported data were available for this sector, the trend for the first half of the 1990's showed sharp production increases for nonferrous metals.

Ukraine reported possessing a wide range of nonferrous metal deposits that included copper, gold and silver, lead and zinc, mercury and antimony, molybdenum, and nickel. A number of copper ore discoveries have been made which are now being assessed for their commercial value. Copper-bearing sandstones have been discovered in the sub-Carpathian region of Ukraine, as well as in the Bakhmuts' and Kal'mius-Torets' depressions of the Donbass. Copper pyrites were found in the Dnieper region and in the Krivoriz'-Kremenchuts' zones. Porphyry copper deposits have been located in the Kons'ko-Rozdor region; copper-nickel sulfides in the central Dnieper region; and native copper deposits have been found at Volin (Volyn). The latter are being assessed for their economic potential as they reportedly bear substantial similarity to the copper deposits of the Great Lakes region of the United States.

Although Ukraine did not possess a domestic gold mining industry in 1995, interest in the country's potential gold deposits has increased significantly in recent years. The country's main gold-bearing regions were the Ukrainian Precambrian shield (Pobuzh, Kirovgrad, and Central Dnieper regions), with resources believed to amount to 75% to 80% of Ukraine's gold producing potential; Donbass (Nagol'niy region), with about 10% of Ukraine's gold resources; and the Carpathian Mountain Zone with 15% of the country's gold resources. For a more in depth geological description of the gold ores in these regions, refer to the journal Mineral'ny Resursi Ukraini, Kiev, February 1995, pages 8-12.

Each of Ukraine's three gold-bearing regions reportedly were believed to have the potential to form a basis for the country's gold mining and processing industry. However, the Carpathian Mountain Zone appeared to be the mostly likely area for initiating development.

Ukraine reported two potential mining areas for the development of lead and zinc. The first region is in the Carpathian Mountains with gold-lead and zinc-bearing polymetallic deposits in the Beregivsk area. The Donbass forms the second potential region where lead and zinc mineralization is found in breccias associated with deep salt domes. These deposits have complex geologic conditions and are characterized by relatively low metal content. Reportedly, the Government of Ukraine plans to develop the Muzhievskoye lead-zinc deposit in the Carpathian Mountains to supply domestic industry.

According to information presented at the International Magnesium Association conference in Yamaguchi, Japan, June 2-4, 1996, in a paper entitled Magnesium Industry in Russia by Pavel G. Detko and Adrey B. Kudlay, Ukraine possessed two of the four magnesium production plants that were operating in the FSU. The Zaporozhye titanium-magnesium plant, built in 1935, was the first titanium sponge plant in the FSU, with magnesium production based on the electrolysis of carnallite from the Verkhne Kamsk deposit in the Urals in Russia. Production of magnesium for sale at Zaporozhye had stopped in 1992. The Kalush magnesium plant of the Kalush "Chlorvinyl" Industrial Association was the newest facility built in the FSU with the source of raw materials brines from a fertilizer plant that processed material from the Ivano-Frankovsk mixed potassium-magnesium deposit in Ukraine. The treated brines are used in the preparation of artificial carnallite for magnesium production. Output of magnesium for sale at Kalush had fallen from a peak of 18,000 t in 1986 to 12,000 t in 1994, but had increased to 13,000 t in 1995.

In 1995, Ukrainian nickel mine reportedly remained at its 1994 level. The country has small deposits of nickel silicates associated with weathered ultrabasic rocks in the Pobuzh and Central Dnieper regions, with the former region reportedly having the largest share of nickel resources. However, Ukraine has been experiencing depletion of its nickel reserves. It was projected that the Lipovenkovskoye nickel deposit in central Ukraine could be depleted in 5 years. Therefore, the Ukrainian Ministry for Industry was considering developing the Tarnovatskoye nickel deposit containing an estimated 4.94 Mt of ore with a 16-year mine life expectancy. Ores at Tarnovatskoye are graded at 0.96% nickel compared with 0.65% at Lipovenkovskoye. Ukraine produced only ferronickel from its nickel ores with one plant

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producing ferronickel at Pobugskoye in the Kirovgrad region.

Ukraine was the sole mine producer of titanium ore in the FSU. About 80% of the country's mine output of titanium was processed at industrial enterprises in other republics of the FSU (Russia and Kazakstan). The balance of Ukraine's titanium ore was consumed by the country's sponge-producing enterprise at Zaporizhya (Zaporozhye) and pigment plants at Sumy and Armyansk on the Crimean Peninsula.

In 1995, titanium was mined at two secondary placer fields in Ukraine, the Irsha and Verkhnedneprovsk. At the Irsha field, mining operations began in the 1950's. Buried sands along the channel of the Irsha River (near Zhitomir) and sands in areas exposed to seasonal flooding began to be worked in 1951. Titanium-bearing horizons in the sands, which were 2 to 8 meters (m) in thickness at depths ranging from 3 to 12 m, contained 1.2% to 4.8% ilmenite, yielding a lower-grade ilmenite concentrate (50% to 56% TiO_2) that served as a feedstock for pigment production. Mining at the Irsha field has featured a combination of dredging, hydraulic operations, and shallow open pit workings, depending upon the workability of sands and their location relative to the water table and the main river channel. At present, all reserves at the "dredging fields" of the original deposits at Irsha have been exhausted.

Since the early 1970's mining has been shifting to new deposits at the Irsha field (Valki-Gatskovo, Lemnen, Shershnevskiy) with reserves that are only a fraction of those of the initial placers. Because of rapid depletion, it was expected that there would be a sharp decline in the production of concentrates from Irsha beyond the year 2000. The capital required to bring on-stream still newer deposits in the Irsha field (Stremigorodskiy, a residual placer [weathering crust] and Torchinskiy, an alluvial placer) is believed to be so large as to be beyond the capacity of the Irsha enterprise without the assistance of outside investors.

The second major titaniferous placer field, the Vekhnedneprovsk (Upper Dnieper), unlike Irsha, contains complex ores that include ilmenite, rutile, and zirconium. Presently, it is the largest mine producer of titanium in Ukraine, with the greatest output coming from the Malyshevskiy deposit. Mining has occurred at seven open pits, the first six have been depleted. The average thickness of exploitable titanium-bearing sands in the pits (former sea bottom deposits [marine placer]) has ranged from 11 to 14.5 m under 38 to 42 m of overburden. Unlike the situation at the Irsha fields, the Malyshevskiy deposit was believed to be exploitable for about 25 more years, although with a substantial decline in output. Considerable development potential reportedly exists in the Eastern sector of the deposit, but so far the Verkhnedneprovsk Mining and Metallurgical Integrated Works has lacked the capital necessary to develop new mining operation. Longer-term plans to develop the new Matronovskiy deposit have faced similar difficulties.

Lower-grade ilmenite concentrates from Verkhnedneprovsk (50% to 56% TiO_2)have been used in pigment production, and part of the higher-grade concentrates (56% to 65% TiO_2) were used for titanium sponge production and part for ferrotitanium production. Titanium produced from rutile concentrates from this field find special uses in the production of welding-rod coatings, among other things.

Foreign commercial activities in the country's titanium industry in 1995 included a joint venture between the Government of Ukraine and Renison Goldfields Consolidated to explore and evaluate titanium deposits with the potential for large-scale development as well as several tailings piles containing commercial quantities and grades of ilmenite.

Ukraine was reported to have a fairly broad range of industrial minerals in amounts sufficient for most domestic needs as well as for export. The country's resources of some industrial minerals such as graphite appear to be substantial and Ukraine was the major producer of graphite in the FSU. Estimated undiscovered resources of graphite in the Ukrainian shield (Mariupol', Petriv, Zavaliv, etc.), as well as newly discovered sites at Burtin, Balakhiv, and Sachkinsko-Troitsk were according to Mineral'ny Resursi Ukraini, Kiev, February 1995, page 7, in excess of 2 billion t. Also, according to a paper presented at the 12th Industrial Minerals Congress by Charles Watts-Jones, Ukraine has three of the FSU's eight soda ash plants with a total annual capacity of over 1,500 t of soda ash. The Ukrainian plants use the Solovay process and make use of local salt and limestone deposits.

Moreover, diamonds were first discovered in Ukraine in 1949 as well as kimberlite pipes and dykes. Further exploration recently has been proposed in the Azov, central Pobush, and Volyn-Podolya, areas which according to the journal Mineral'ni Resursi Ukraini, Kiev, January 1995, pages 4-5, have the most promising potential for diamond discoveries.

In 1995, the joint-venture Keramnedra was formed between Ukraine and Slovakia to manufacture semifinished china clay products for the ceramics, rubber, and plastics industry. The joint venture will explore and develop the Beregovo china clay deposit in the Zarkapatska region. Ukraine reportedly has 20 primary kaolin deposits in 10 regions, of which 13 of these deposits having combined reserves of 460 Mt were under development. Total primary kaolin reserves were reportedly 996 Mt.

The largest china clay producers were the Glukhovetsky mining-beneficiation complex in the Vinnitsa region which supplies raw materials for paper and cardboard manufacturing and the Turbov china plant in the Vinnitsa region. In 1995, primary kaolin production in Ukraine was 950,000 t, having decreased by 65,000 t compared with 1994, of which 257,523 t was exported to Italy, Poland, Russia, Slovakia, and other countries.

Ukraine, which is one of the leading countries in Europe in facing stone reserves, has only developed a small portion of these reserves. Ukraine reportedly is exploiting 70 stone deposits, including 32 granite deposits. The country in 1994 cut 27,344 cubic meters (m^3) of facing stone blocks and

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decorative tiles and 111,000 m^3 of granite. The country reportedly has explored reserves of 507.5 million m^3 of stone in 131 stone deposits, including 208.2 m^3 of granite at 47 deposits. In 1995, a United States-Ukrainian joint-venture "Biyutaga" was formed to quarry granite at the Tovoskoye deposit in Dnepropetrovsk oblast. The project will produce granite blocks and tiles to be used mainly in construction of a subway network in Dnepropetrovsk.

In 1995, Ukraine's coal production decreased by 11% compared with 1994 to 83.6 Mt. This figure may be even lower than reported as the Ministry of the Coal Industry in conjunction with the Ministry of Statistics significantly increased the norm for ash content. Furthermore, the sulfur content of coal from Ukraine is high with coal with up to 4% sulfur content being burned at powerplants.

Coal is the country's major energy source and accounts for over 40% of electric power generation. However, coal-fired powerplants in Ukraine generally have to be boosted with natural gas or boiler fuel. In 1995, powerplants were reported working at only 40% of capacity because of fuel shortages.

Because of decreasing coal production, Ukraine was importing coal, mainly from Russia and Poland. Ukraine also exported coal to acquire hard currency. Although plans called to close 15 coal mines by yearend 1995, only 6 were closed, so that 262 coal mines would remain open in 1996. The coal mining work force in 1995 decreased by 9.3% compared with 1994 to 426,000 persons, and was about 20% below the employment level of 529,000 in 1992. The decrease in the number of miners and the increase in strikes were attributed in part to the country's inability to make timely wage payments to miners.

Plans call for Ukraine to increase coal production capacity to between 150 and 155 Mt/yr by 2005 and to 170 Mt/yr by 2010-2016. Development of 1 open pit and 21 underground mines is planned. Total new capacity of 38.6 Mt/yr is planned, of which new mining development is planned to be producing 7.5 Mt/yr by 2005. The country will have to obtain investment funds to carry out this program. The country has not allocated funds for new mine construction for several years and existing mines are badly in need of funding for maintenance and renovation.

In 1995, Ukraine reportedly produced 18.17 billion m^3 of natural gas which was 1% less than the amount produced in 1994. Ukraine's natural gas production covers about 20% of the country's consumption needs. Slightly under 20% of the electricity generated in the country is from powerplants operating on natural gas. In 1995, Ukraine received 51.2 billion m^3 of natural gas from Russia, and was Russia's main gas customer in the FSU. As of December 1995, Ukraine reportedly owed Russia over 9.2 trillion rubles for natural gas.

Ukraine in 1995 produced 3.02 Mt/yr of crude petroleum which was a 5% decrease in production compared with 1994. Ukraine received 10.9 Mt of oil from Russia in 1995 and was Russia's largest customer for oil in the FSU. Ukraine also in 1995 imported 2.4 Mt of oil from Kazakstan. In April 1995, the European Bank for Reconstruction and Development provided a loan to the Poltava Petroleum Company, a Ukrainian-British joint venture to develop the Ignatovskoye field in the southern Poltava region in central Ukraine. Production from this field is projected to be about 250,000 t/yr of crude oil.

In 1995, Ukraine's five nuclear powerplants produced 70.5 billion kilowatt hours of electric power, which was a 2.4% increase compared with 1994. In 1995, nuclear power accounted for 36.7% of electricity generated. Reportedly there were 85 malfunctions at nuclear powerplants in 1995, which was less than 1994 with 133 and 1993 with 167. Ten of the malfunctions were deemed to be level one on the international scale and the remainder were deemed zero. The most malfunctions occurred at the Zaporozhye nuclear powerplant with 35 and the least at Chernobyl with 3.

Although it has one of the largest mineral industries in the FSU, Ukraine's mineral industry faces great economic difficulties in making the transition to a market economy in terms of modernization and rationalization, which is of particular need in those mineral industry sectors with depleting deposits and deposits with low quality or low grade ores, and for those sectors not producing products competitive on world markets. If adequate investments are made, it may be possible to produce a wider range of concentrates and products that meet world standards, but the cost of such investment will be assessed in terms of the potential profitability of such industries.

These issues apply to Ukraine's ferrous metals mining, steel and ferroalloys industries. However, Ukraine possesses practically all of the ingredients to engage in full cycle production of ferrous metals and downstream products. Ukraine has iron ore and manganese mines and steel and ferroalloys plants, all within close proximity as well as a large machine building sector and a well trained and relatively inexpensive labor force. Ukraine also is situated on the Western border of the FSU as well as on the Black Sea and thus has good access to European and world markets. The combination of the availability of raw materials, processing facilities, manufacturing facilities, low priced and well trained labor, and good access to markets, may offer creative investment opportunities for producing value added products from ferrous metals.

Ukraine also possesses undeveloped or underdeveloped mineral resources including graphite, titanium, and a range of industrial minerals that may offer opportunities for future development.

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[1]The author extends his appreciation to Mr. Konstantin A. Sukhodolsky of the Fund for Geological Information (Geoinform), Ukraine for reviewing and editing parts of the text.

Other Sources Of Information

State Committee of Geology and Mineral Resources Utilization

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vul. Volodymyrska, 34
262601, Kiev, Ukraine
Telephone: 380 44 228 5672/226 2007
Fax: 380 44 228 6221

Ukrainian State Fund for Geological Information (Geoinform)
16, Ezhena Potye St.
252057, Kiev, Ukraine
Telephone: 380 44 446 60 61
Fax: 380 44 446 61 61

Ministry of Industry
vul. Maryny Raskovoi, 15
Kiev, Ukraine 252167
Telephone: 380-44-226-2623
Fax: 380-44-227-4104

Ministry of Environmental Protection
5 Khreshchatyk St.
Kiev, Ukraine 252001
Telephone: 380-44-226-2428
Fax: 380-44-229-8383

TABLE 1
UKRAINE: ESTIMATED PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity	1992	1993	1994	1995
METALS				
Alumina	1,250,000 r/ 2/	1,200,000 r/	1,200,000	1,230,000 2/
Aluminum:				
Primary	100,000 2/	100,000	100,000 r/	98,000 2/
Secondary	72,000 2/	50,000	40,000	40,000
Total	172,000	150,000	140,000 r/	140,000
Cadmium	5 2/	7	10 2/	10
Ferroalloys				
Blast furnace:				
Ferromanganese	50,000	40,000	30,000	30,000
Spiegeleisen	5,000	4,000	3,000	2,500
Electric furnace:				
Ferromanganese	100,000	80,000	60,000	60,000
Silicomanganese	1,000,000	700,000	600,000	500,000
Ferrosilicon	500,000	400,000 r/	350,000 r/	300,000
Ferronickel	100,000 r/	60,000 r/	38,800 2/	38,800
Other	40,000	30,000 r/	25,000 r/	25,000
Total	1,795,000	1,314,000	1,106,800	956,300
Germanium	20 2/	21	22 2/	22
Iron ore	75,700,000 2/	65,000,000	51,300,000 2/	51,000.000 2/
Lead, metal	20,000 2/	15,000	15,000 2/	5,000 2/
Magnesium	16,000 r/	15,000 r/	12,000 r/	13,000
Manganese:				
Marketable ore 2/	5,820,000 3/	3,800,000	2,979,900	3,200,000
Mn content	1,850,000 2/	1,350,000 2/	1,050,000 2/	1,060,000
Mercury	100	80	60	60
Nickel, mine output, metal content	5,900 2/	3,000	1,400 2/	1,400
Pig iron	35,300,000 2/	30,000,000	21,200,000 2/	20,000,000 2/
Silicon	1,300 2/	1,300	1,400 2/	1,400
Steel:				
Crude 2/	41,800,000	32,400,000	23,798,000	23,000,000
Finished	29,500,000 2/	20,000,000	17,500,000 2/	17,000,000
Pipe	5,100,000 2/	3,000,000 r/	1,600,000 2/	1,600,000
Tin	4,000 2/	3,000	2,000	2,000
Titanium:				
Ilmenite concentrates	450,000 r/ 2/	450,000 r/	530,000 2/	359,000 2/
Rutile concentrate	60,000 2/	60,000 r/	80,000 2/	112,000 2/
Metal, sponge	12,800 2/	10,000	5,000	300 2/
Zinc, metal	20,000 2/	15,000 r/	10,000 r/	3,100 2/
Zirconium concentrates	40,000 2/	40,000 r/	40,000	40,000

See footnotes at end of table.

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TABLE 1–Continued
UKRAINE: ESTIMATED PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity	1992	1993	1994	1995
INDUSTRIAL MINERALS				
Cement	17,000,000	22,000,000	11,400,000 2/	11,000,000
Graphite	10,000 r/	7,000 r/	5,500 2/	6,000 2/
Nitrogen : N content of ammonia	3,908,000 2/	3,242,000 2/	3,000,000 r/	3,100,000
Potash: K_2O content	225,000	200,000	168,000 2/	110,000 2/
Salt	8,000,000	6,000,000	3,940,000 2/	3,500,000
Sulfur, native	800,000	600,000	392,000 2/	310,000 2/
MINERAL FUELS AND RELATED MATERALS				
Coal 2/	134,000,000	115,700,000	95,300,000	83,600,000
Coke	27,500,000 2/	25,000,000	17,000,000 2/	15,000,000
Natural gas thousand cubic meters	20,900,000	19,300,000	18,300,000 2/	18,170,000 2/
Petroleum, crude	4,480,000	4,250,000	3,177,000 2/	3,020,000 2/

r/ Revised.

1/ Table based on information and data available through July 28, 1996.

2/ Reported data

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TABLE 2
UKRAINE: STRUCTURE OF THE MINERAL INDUSTRY FOR 1995

(Metric tons unless otherwise specified)

Commodity	Major operating facility	Location	Annual capacity e/
Alumina	Nikolayev refinery	Nikolayev (Mykolayiv) 1/	1,200,000
Do.	Zaporozhye (Dneprovsk) refinery	Zaporozhye	245,000.
Aluminum, primary	Zaporozhye (Dneprovsk) smelter	do.	110,000.
Coal:			
Hard	Donets coal basin with about 225 mines produces more than 90% of Ukraine's coal	Donetskaya (Donets'ka) 1/ Dnepropetrovskaya (Dnipropetrovs'ka)1/ Luganskaya (Luhans'ka) 1/ oblasts	130,000,000.
Do	L'vov-Volynskiy basin produces remainder from 18 mines	Western Ukraine	6,000,000.
Brown	Dneprovskoye basin	Central Ukraine	7,000,000.
Dolomite	Novotroitskoye, Severskoye mining administrations	Novotroitskoye deposit, Yamskoye deposit	3,000,000 (total).
Do.	Dokuchayevskiy Flux-dolomite complex	Yelenovskoye and Stylskoye deposits	
Graphite	Zavalyevskiy graphite complex	Zavalyeviskiy deposit	80,000.
Iron ore	Underground mining:		
Do.	Krivbassruda production association with 16 mines	Kryvoy Rog basin	30,000,000.
Do.	Eksplutatsionnaya Mine of the Zaporozhskiy iron ore complex	do.	3,500,000.
Do.	Open pit mining: Yuzhniy, Novokrivorozhskiy, Tsentralnyy, Severnyy, Inguletskiy, Poltaviskiy and Kamysh-Burunskiy mining and beneficiation complexes	do.	90,000,000 (total).
Lead, secondary	Ukrtsink plant	Konstantinovka (Kostyantynivka) 1/	70,000
Magnesium	Zaporozhye plant	Zaporozhye	10,000.
Do.	Khlorvinil concern	Kalush	20,000.
Manganese ore, marketable	Ordzhonikidze, Marganets mining and beneficiation complexes	Nikopol basin	7,000,000 (total).
Do.	Tavricheskiy mining and beneficiation complex (under development)	Bol'shoy Tomak basin	
Ferroalloys	Nikopol ferroalloys plant	Nikopol	250,000 (ferromanganese).
Do.	do.	do.	1,200,000 (silicomanganese).
Do.	do.	do.	3,000,000 (manganese sinter).
Do.	Stakhanov plant	Lugansk	NA (ferrosilicon).
Do.	Zaporozhye plant	Zaporozhye	300,000 (ferrosilicon). 160,000 (silicomanganese). NA (ferrochrome). NA (ferromanganese). 40,000 (manganese metal).
Mercury	Nikitovskiy mining and metallurgical complex	Donets basin	120.
Nickel	Pobuzhhskiy mining and metallurgical complex, comprising three open pit mines and smelter	Pobuga region	7,000 (nickel in ferronickel).
Potash	Khlorvinil production association, Stebnik potash plant	Pricarpathian region	300,000 (K_2O).
Steel, crude	Azovstal plant	Mariupol	7,000,000.
Do.	Donetsk plant	Donetsk	2,000,000.
Do.	Kommunarsk plant	Kommunarsk (Alchevs'k) 1/	4,500,000.
Do.	Kryvoy Rog plant	Kryvoy Rog	14,000,000.
Do.	Makeyevka plant	Makeyevka	4,000,000.
Do.	Mariupol plant	Mariupol	7,000,000.
Do.	Zaporozhya plant	Zaporizhya	5,000,000.
Sulfur	Sera production association	Rozdol mining complex mines, Rozdol, Soroks, Zhidachev Deposits. Yavorov complex mines. Nemirov and Yazov deposits in L'vovskaya (L'vivs'ka) 1/ and Kiev (Kyyivs'ka) 1/ oblast	1,500,000 (total).

See footnotes at end of table.

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TABLE 2--Continued
UKRAINE: STRUCTURE OF THE MINERAL INDUSTRY FOR 1995

(Metric tons unless otherwise specified)

Commodity	Major operating facility	Location	Annual capacity e/
Titanium, ilmenite and zircon-rutile-ilmenite ores	Irshanskiy mining and beneficiation complex	Irsha River valley	600,000 (ilmenite concentrate).
	Verkhnedneprovskiy mining and metallurgical complex	Verkhnedneprovsk region	120,000 (rutile concentrate). 40,000 (zirconium concentrate).
Titanium, metal	Zaporozhye plant	Zaporozhye	20,000.
Uranium	Zheltye Vody complex	Northern part of Kryvoy Rog asin	NA.
Zinc, secondary	Ukrtsink plant	Konstantinovka (Kostyantynivka) 1/	25,000

e/ Estimated NA Not available.
1/ New name or spelling given, if available, in parenthesis.
2/ Total for both enterprises

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THE MINERAL INDUSTRY OF

THE UNITED KINGDOM

By Harold R. Newman

As a result of favorable geological conditions, the United Kingdom was well endowed with mineral resources. Although metallic ore deposits were typically small, they tended to be relatively high graded. Mine production of ferrous and nonferrous minerals has been declining for the past 20 years as reserves became depleted. Since processing has become the basis of a large and economically important mineral industry, imports are required by industries to satisfy their metallurgical requirements.

The industrial minerals sector has provided a significant base for expanding the extractive industries and there has been a shift in balance away from the metallic mineral sector. The United Kingdom companies have a substantial interest in the production of, both domestic and foreign, industrial minerals, such as aggregates, ball clay, china clay (kaolin), and gypsum.

The offshore United Kingdom sector of the North Sea Oilfield, in its 31st year of activity, continued to be a significant player in the international oil and gas sector. As a result, the country has become a base for international oil companies and a major energy supplier to other countries.

The current statute regarding the development and working of mineral deposits is the 1971 Act, as amended, which consolidates all earlier planning legislation and has been amended by various statutes.

Mineral development was specifically addressed in the Town and Country Planning (Minerals) Regulations, 1971, and the Town and Country Planning (Minerals) Act, 1981. Minerals were defined in section 209 of the 1971 Act to include all minerals and substances in or under land of a kind ordinarily worked for removal by underground or surface workings, except it does not include peat cut for purposes other than for sale.

Mineral rights to mineral fuels such as coal, petroleum, and uranium, belong to the state. Formerly, British Coal Corp. (BC) controlled almost all the mineral rights to the national coal reserves. This control now rests with The Coal Authority, which is authorized to license open pit and underground mines to the private sector subject to restrictions on size and the payment of royalty on the amount of coal produced.

Most other mineral rights in Great Britain are privately owned. The exception is gold and silver, the rights to which are vested in the Royal Family and are referred to as Crown Rights. A different situation regarding mineral rights applies to Northern Ireland where, under the Mineral Development Act (Northern Ireland), 1969,the right to work minerals and the right to license others to do so is vested in the state, as opposed to private ownership.

Currently, there is no national registry for mineral rights in the United Kingdom, except for hydrocarbons. This has created problems and is a matter of concern for the mining industry. Locating current owners of mineral rights on some properties can be a costly and time-consuming process.

A significant event of 1995 was the completion of the privatization of BC which had been in the Government sector since 1947, when the industry was nationalized. BC had consisted of six underground mining groups and the Opencast Executive, which was responsible for open pit mining. BC owned most of the coal reserves in the country and licensed and collected royalties from the privately owned mines. At yearend, 22 underground mines and 32 open pit mines, all privately owned, were in production. Open pit coal production continued to increase. In underground coal operations, production decreased as reserves were depleted even though overall productivity increased almost 17%.

The steel sector's operations showed a moderate improvement as the demand for steel increased. British Steel (BS) was reportedly utilizing 80% of its production capacity. Production of tin concentrate continued from the one remaining tin mine in Cornwall. *(See table 1.)*

The United Kingdom has shifted from being a net exporter of goods as recently as 1986 to being a net importer. Part of the reason for the weaker export performance has been problems in the United Kingdom sector of the North Sea Oilfield. These have been mostly resolved. Other contributing factors were adverse currency exchange rates with trading partners and a petroleum surplus. The United Kingdom's export trade is dominated by petroleum.

Table 2 shows the impact of selected classes of mineral commodities on the United Kingdom's balance of payments position in relation to the European Union and the world. The figures, in thousands of dollars, are for 1994, the latest year for which data were available. *(See table 2.)*

The Department of Trade and Industry (DTI) has the responsibility to ensure a continuing supply of minerals for

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the country's industry. DTI's area of responsibility includes all nonenergy, nonconstruction minerals, including metallic ores and such industrial minerals as barite, china clay (kaolin), fluorspar, high-grade limestone, potash, salt, and silica sand.

The Department of Energy (DOE) was formerly responsible for mineral fuels that included coal, natural gas, and petroleum, and also for issuing licenses for the exploration, appraisal, and production of natural gas and petroleum. The responsibility for these DOE functions was absorbed by DTI. A new Metals and Minerals Branch was formed to oversee these activities.

DOE remains responsible for minerals used in the construction industry. These include aggregates, brick and brick clay, cement and its raw materials, dimension stone, gypsum for plaster, and sand and gravel. Both state and privately owned corporations produce minerals and mineral-based products. State ownership was mostly in the mineral fuels and nuclear power industry. *(See table 3.)*

Of the four primary aluminum smelters in the United Kingdom, three are owned and operated by British Alcan Aluminium Ltd. The fourth smelter, operated by Anglesey Aluminium Ltd., is 51% owned by RTZ Corp. of the United Kingdom, and 49% owned by Kaiser Aluminum and Chemical Corp. of the United States. All of the aluminum smelters depend on imported alumina for feedstock.

British Alcan signed a new contract with RJB Mining to supply the company's 390-megawatt Lynemouth power station with 5 million metric tons (Mt/yr) of coal over the next 5 years.

The secondary aluminum metal industry in the country treats recycled aluminum and low-grade aluminum scrap, such as swarf. The main consuming sector for secondary aluminum ingot is the automotive industry.

Activities in gold exploration and development in the United Kingdom increased in 1995. Northern Ireland, Scotland, and Wales continued as the three main areas of exploration by companies. Scotland was the most active area with several exploration licenses in effect.

The MIDAS project, a major investigation of gold mineralization at numerous deposits in the Caledonian and Hercynian orogenic belts of Europe, was completed under the leadership of the British Geological Survey. Evaluation of multidisciplinary digital data for selected deposits allowed a classification of the gold mineralization styles to be established. On this basis, metallogenic models were presented in the final report and the optimum exploration methodology for each deposit type defined.

Omagh Minerals Ltd. received formal governmental consent for its open pit gold mine at Cavanacaw, County Tyrone, Northern Ireland. Site work was scheduled to commence in 1996. The company estimated it could have a production of 373 kilograms per year (kg/yr) of gold and 466 kg/yr of silver for an initial 7 year period. Exploration was continuing to define further reserves.

In early 1995, Caledonia Mining Corp. acquired Fynegold Exploration and its Cononish gold deposit near Tyndrum, 96 km north of Glasgow, Scotland, from Ennex International PLC for a reported $4.25 million and 500,000 shares of Caledonia. Production was expected to commence in 1997 at a rate of 715 kg/yr. Ennex International PLC, operating as Ulster Minerals Ltd., reported that its Curraghinalt deposit near Gortin, County Tyrone, Northern Ireland, contained estimated probable reserves of 248,000 metric tons (t) of ore grading 11.32 g/t and estimated probable reserves of 660,000 t of ore grading 8.92 g/t. Exploration was continuing in an attempt to block out sufficient ore to justify mine development. Production of iron ore was limited to a small amount of hematite ore mined by Egremont Mining Co. at the Florence Mine in Cumbria. Production of ironstone ceased after 1992. Primary steel production was based on imported iron ore, mainly from Australia and Brazil.

BS's integrated steelworks were producing above the level of last year. BS reported this was because of a moderate increase in steel demand reflecting an improved economy. Projects completed included the cold mill link enhancement at Port Talbot, a heavy section mill at Scunthorpe, and coil handling and quench facilities at Llanwern. The second ladle arc furnace at Scunthorpe was due for completion in 1996.

MIM Holdings (U.K.) Ltd. purchased the Avonmouth lead-zinc smelter from Pasminco Ltd. reportedly for about $72 million. The Avonmouth plant is the world's largest Imperial Smelting Process (ISP) smelter. The ISP plant has a capacity of 55,000 metric tons per year (t/yr) of lead and 120,000 t/yr of zinc. The purchase of the Avonmouth plant could provide another in-house outlet for the bulk lead-zinc concentrates produced from MIM's Mount Isa/Hilton complex in Australia.

Canadian South Crofty Holdings', formerly Carnon Consolidated Tin Mines Ltd., South Crofty Mine, near Camborne, Cornwall, produced about 187,000 t/yr of ore averaging 1.22% tin which was sent to the company's Wheal Jane mill near Truro. The treatment produced a 58% grade of tin concentrate. Most of the concentrate was exported to Malaysia.

Canadian South Crofty initiated a $4.8 million major improvement program, including deepening of the mine to the 470 Fathom Level.

DOE has made proposals to limit the growth of land-based quarrying in England and Wales by 20% during the next 20 years. The proposals included the expansion of coastal superquarries, such as Foster Yoeman Ltd.'s Glensanda quarry at Oban, Scotland, and the use of recycled material in construction.

Redlands Aggregates Ltd. was waiting permission from

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the Secretary of State of Scotland to develop a coastal superquarry at Lingarabay, Scotland. Redlands estimated the proposed quarry has reserves of 600 million metric tons (Mt) of anorthosite. Capacity of the proposed project would be about 1 Mt/yr and increasing, over a number of years, to between 5 Mt/yr and 12 Mt/yr.

ARC Marine Plc, a subsidiary of the Hanson Group, was to acquire Barton Group's marine aggregate subsidiary, Civil and Marine Ltd, for about $100 million. Civil and Marine produces about 4 Mt/yr of marine aggregate. This acquisition would make ARC Marine the largest United Kingdom marine aggregate producer.

There were signs that the recession in the building and construction industry, which severely restricted raw material demand, appeared to be over. The United Kingdom's construction output increased by an estimated 3%, and included a high proportion of cement-intensive new work. Cement consumption was up an estimated 12%. The firmer market led to a modest cement price recovery, the first increase in a number of years.

Blue Circle Cement Ltd. was the United Kingdom's largest cement producer with about 49% of the domestic market share. Castle Cement Ltd. was second with more than 25% of the market share.

The United Kingdom was the leading world producer and exporter of ball clay, as well as the world's largest exporter and second-largest producer, after the United States, of kaolin (china clay). Watts, Blake, Bearne & Co. PLC (WBB) was the country's largest producer of ball clay. English China Clays PLC (ECC) was the largest producer of kaolin in the United Kingdom and one of the major producers worldwide. ECC usually exports about 85% of its product, mainly to western Europe.

All mining of ball clay was carried out in Dorset and Devon Counties in the southwest area of the United Kingdom. WBB Devon Clays Ltd. is responsible for the ball clay operations of WBB. The division operated eight open pit mines and three underground mines that have a total combined output of 500,000 t/yr of crude ball clay. The company announced it was merging its Devon pits into a single operation.

ECC Ball Clays Ltd. is responsible for the ball clay operations of ECC. The division operates five quarries, three underground mines, and two open pit mines with a combined output of 450,000 t/yr of crude ball clay. Seventy percent of the output was exported.

ECC International Ltd. (ECCI) operated ball clay and kaolin mines and quarries in the Wareham Basin in Dorset; in the Bovey Basin in south Devon; and in the Petrockstowe Basin in north Devon. A majority of the production is from the Bovey Basin.

ECCI announced a major capital expenditure program for the Cornwall and Devon areas of around $56 million. The company stated that most of the expenditure will be in the areas of clay refining and drying to include installation of fluid-bed dryers and superconducting magnetic separators, enhancement of selective froth flotation of coarse residues and subsequent sand grinding to produce a range of particle sizes. These process developments were expected to increase recovery of kaolin from the clay matrix to over 90%, as against 70% a few years ago.

Fluorspar mining was concentrated in Derbyshire from the Southern Pennine deposit, and the major producer was Laporte Industries PLC. Laporte operates two underground mines and one open pit mine. The latest operation, the Milldam Mine, came on-stream in 1992. The company expected the mine to produce 85,000 t/yr of ore grading 45% to 50% calcium fluoride. The ore is processed at Laporte's Cavendish Mill near Sheffield.

British Gypsum Ltd. (BG), the subsidiary of BPB Industries PLC, was the major producer of gypsum in the United Kingdom. The company has mines in Cumbria, Leicestershire, Nottinghampshire, Staffordshire, and Sussex that produce about 3 Mt/yr of gypsum. With few exceptions, all of this material goes to supply the domestic market.

Desulphogypsum, the synthetic gypsum produced by the neutralization of sulfur dioxide contained in flue gases at coal-fired power stations, was produced in 1995 for the first time in the United Kingdom. Total output in 1995 was about 600,000 t. The amount of desulphogypsum produced at flue gas desulphurisation (FGD) units is dependent on two main factors: the electricity output of the power station, and the proportion of sulfur in the coal. The FGD plant is designed to remove sulfur at levels of up to 2.8% in coal. The coal delivered from the Selby Complex contains about 1.1% sulfur. Output of desulphogypsum was supplied to BG for plasterboard manufacture.

Cleveland Potash Ltd. (CPL) operated the Boulby Mine in Yorkshire and was the only potash producer in the United Kingdom. The company also mined rock salt, as a coproduct, from an underlying seam in the Boulby Mine. The production ratio was about a 2:1 potash-to-salt. CPL was continuing with a $10-million capital investment program to improve recovery at the Boulby Mine.

TMC Pioneer Aggregates Ltd., a joint-venture operation between Pioneer Aggregates (UK) Ltd. and TMC Ltd., was developing what was expected to be the largest sand and gravel operation in the United Kingdom. Production was planned to be between 1 Mt/yr and 2 Mt/yr. The quarry, at Boreham, Essex, covers 480 hectares with estimated reserves of 34 Mt. Pioneer Aggregates owned 26 quarries in the United Kingdom.

Most slate mining in the United Kingdom was in north Wales, with additional mining operations in Cornwall and the Lake District. Penrhyn Quarries Ltd., Bangor, North Wales, was the largest slate operation, producing around 25,000 t/yr of roof slate. The quarry, measuring 2,415 m by 805 m, was considered to be the world's largest slate quarry. Penrhyn produced more than one-half of the

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United Kingdom's entire production of roofing slate. The company exported about two-thirds of its production.

At the end of 1994 all mines, underground and opencast, of the publicly owned coal industry were returned, after 48 years, to the private sector. The sale included 21 underground mines, 32 opencast mine sites, over 700 Mt of coal reserves, and contracts to supply over 100 Mt of coal to electricity generators in England, Scotland, and Wales by March 1998.

By yearend 1995, the United Kingdom coal mining industry was mostly in the ownership of RBJ Mining which operates 19 underground mines and 21 opencast mines with estimated coal reserves of 540 Mt (underground) and 20 Mt (opencast). RBJ is the largest United Kingdom coal mining company and the largest independent coal producer in Europe. In 1995, RJB produced an estimated 38 Mt of coal, of which about 80% was from underground operations. The largest operation was the underground Selby Complex which produces about 12 Mt/yr.

Mining (Scotland) Ltd acquired all operations in Scotland (nine opencast sites and the underground Longannet Mine) with estimated coal reserves of 70 Mt, and Celtic Energy Ltd acquired all operations in Wales (nine opencast sites) with estimated coal reserves of 50 Mt.

A group of seven petroleum and natural gas companies were studying the feasibility of a natural gas interconnection between the United Kingdom and continental Europe. The Government had indicated its support for the project in the context of the future integration of European trade in natural gas. The 243 km long, $425 million, 15-billion cubic meters per year capacity natural gas pipeline would be built from the Bracton terminal, Norfolk, to Zeebrugge, Belgium. The first natural gas likely to enter the proposed pipeline would come from the Britannia field jointly operated by Chevron and Conoco. Britannia, slated for production in 1997, was the largest United Kingdom offshore gas field under development.

The most significant new offshore field in production in 1995 was the Liverpool Bay complex centered on block 110/13, including Douglas (petroleum), Hamilton and Hamilton North (gas), and Lennox (petroleum and gas). First natural gas production was in December 1995, with petroleum production to begin in early 1996.

The 16th round of tenders was announced in November 1994 and exploration licenses were awarded in May 1995 for all of the 26 blocks offered in the west of Scotland.

The United Kingdom has an onshore producing oilfield, the Wytch Farm Field in Dorset, containing estimated reserves of 450 million barrels. Exploration and drilling by British Petroleum confirmed that the field extends offshore under Poole Bay.

Rail and trucking transportation is well developed. The state-owned British Railways operates a 16,629-km, 1.435-m standard-gauge system with 4,205 km of electrified and 12,591 km of double or multiple track. In additional standard-gauge and narrow-gauge lines are privately owned and operated. Northern Ireland Railways operates a 332-km, 1.600-m gauge system with 190 km of double track.

All three major steel-producing areas are on or near tidewater. Petroleum refineries are likewise on the coast. The major cargo ports are Bristol, Liverpool, London, and Southhampton in England; Glasgow in Scotland; Cardiff and Milford Haven in Wales; and Belfast in Northern Ireland.

Transportation, not only in the United Kingdom but also in the whole of Europe, changed significantly with the completion and operation of the Channel Tunnel. The tunnel, referred to as the "Chunnel," has been constructed underneath the English Channel and connects Folkestone, England, and Coquelles, near Calais, France. From these terminals, people drive their cars and trucks onto trains that transport them 49 km to the other side in about one-half hour. Everything transported through the tunnel will move by rail. The Channel Tunnel, linking the two countries, was expected to be a vital component of the European single market concept.

The United Kingdom is a significant player in the world mining and mineral processing industries. This is more the result of an extensive range of companies in the country, with various interests in the mineral industry internationally, rather than production from the domestic industry. This is expected to continue.

Exploration is expected to continue onshore and offshore. Onshore exploration activities will be mainly directed toward precious metals. Offshore exploration interest will continue to be focused on North Sea areas, particularly the area west of Shetland Islands, the Central North Sea and the Southern Gas Basin.

The Government publication "UK Strategy for Sustainable Development" is expected to be a significant framework for the development of mineral resources. There will be further efforts to raise the level of environmental management and to maximize the best use of natural resources, including use of recycled materials and alternate sources of energy.

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TABLE 1
UNITED KINGDOM: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity		1991	1992	1993	1994	1995 e/
METALS						
Aluminum:						
Alumina from imported bauxite e/		110,000	120,000	105,000	105,000	110,000 2/
Metal:						
Primary		294,512	244,168	239,099	231,223	237,899 2/
Secondary		163,000	252,000	274,000	248,900	282,000 2/
Cadmium, metal including secondary		449	383	458	469	549 2/
Copper:						
Ore and concentrate, Cu content		294	--	--	--	--
Metal, refined:						
Primary		16,606	10,363	10,629	11,078	8,874 2/
Secondary		53,455	31,704	35,949	35,586	42,993 2/
Total		70,061	42,067	46,578	46,664	51,867
Iron and steel:						
Iron ore:						
Gross weight		59,400	30,900 r/	1,100	1,300	1,000
Fe content		13,570	7,130	253	299	250
Metal:						
Pig iron	thousand tons	11,883	11,500	11,534	11,943	12,238 2/
Ferroalloys, blast-furnace:						
Ferromanganese	do.	178	137	45	--	--
Steel, crude	do.	16,474	16,212	16,625	17,286	17,204 2/
Rolled products	do.	19,500	14,000	13,500	14,000	14,000
Lead:						
Mine output, Pb content		1,020	1,000	1,000	2,000	1,600
Metal:						
Smelter:						
Bullion from imported concentrate		40,304	42,164	45,183	36,619	38,311 2/
Secondary (refined) e/ 3/		110,000	100,000	154,193	100,000	100,000
Total e/		150,304	142,164	199,376	136,619	138,311
Refined:						
Primary 4/		164,338	198,805	209,560	191,036	150,208 2/
Secondary 3/		146,676	147,990	154,193	161,430	167,466 2/
Total e/		311,014	346,795	363,753	352,466	317,674
Magnesium metal, secondary including alloys e/		800	800	1,000	1,000	1,500
Nickel metal, refined e/ 5/		29,000	28,000	27,000	28,400	31,800
Silver, mine output, Ag content	kilograms	565	--	--	--	--
Tin:						
Mine output, Sn content		2,325	2,040	2,232	1,922	1,971 2/
Metal:						
Primary		1,660	--	--	--	--
Secondary (refined)		3,580	100	100	100	100
Zinc:						
Ore and concentrate, Zn content		1,078	--	--	--	--
Metal, smelter		100,651	96,813	102,391	101,300	100,000
INDUSTRIAL MINERALS						
Barite 6/		85,505	76,723	32,623	54,000	85,000
Bromine		29,323	29,903	27,423	33,800	30,000
Cement, hydraulic	thousand tons	12,297	11,006	11,039	12,493	12,500
Clays:						
Fire clay	do.	867	572	479	679	700
Fuller's earth 7/	do.	189	189	187	134	130
Kaolin (China clay) 8/	do.	2,911	2,502	2,461	2,530	2,650
Ball clay and pottery clay 8/	do.	729	744	746	825	870
Other, including shale e/	do.	13,038	12,155	10,891	12,464	14,000
Diatomite e/		220	120	200	180	--

See footnotes at end of table.

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TABLE 1–Continued
UNITED KINGDOM: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity		1991	1992	1993	1994	1995 e/
INDUSTRIAL MINERALS–Continued						
Feldspar (china stone)		6,417	8,243	6,960	8,400	8,000
Fluorspar, all grades 9/		77,903	76,129	70,285	50,000	55,000
Gypsum and anhydrite e/	thousand tons	3,500	3,000	2,500	2,000	2,000
Lime, quicklime and hydrated e/	do.	2,800	2,500	2,500	2,500	2,500
Nitrogen, N content of ammonia	do.	1,010	869	873	1,006	1,000
Potash, K_2O equivalent		495,000	529,000	550,000	580,000	560,000
Salt:						
Rock	thousand tons	1,640	1,500	1,200	1,700	1,800
From brine	do.	1,320	1,200	1,300	1,300	1,300
In brine, sold or used as such	do.	3,870	3,400	4,080	4,004	4,000
Sand and gravel: e/						
Common sand and gravel	do.	89,311	88,900 2/	89,500	91,450	104,000
Industrial sand	do.	3,900	3,620 r/	4,000	4,038	4,200
Sodium compounds, n.e.s, carbonate	do.	1,000	1,000	1,000	1,000	1,000
Stone:						
Crushed:						
Calcite e/	thousand tons	8	4	4	3	–
Chalk	do.	10,317	9,171	9,076	10,236	10,000
Chert and flint	do.	5	–	–	–	–
Dolomite	do.	19,454	18,539	17,985	17,616	16,000
Igneous rock	do.	53,948	57,654	57,766	56,494	50,000
Limestone	do.	93,861	89,399	93,727	106,626	97,000
Sandstone including ganister	do.	16,607	14,890	16,059	18,974	17,000
Slate including fill	do.	293	326	462	308	350
Total e/	do.	194,493	189,983	195,079	210,257	190,350
Dimension:e/						
Igneous	do.	127	100	100	100	100
Limestone	do.	243	200	200	200	200
Sandstone	do.	200	200	200	200	200
Slate	do.	67	66	61	60	60
Strontium minerals		2,000	2,000	1,000	–	–
Sulfur, byproduct: e/						
Of metallurgy		65,000	60,000	72,000	70,000	50,000
Of petroleum refining		140,000	175,000	200,000	150,000	200,000
Total		205,000	235,000	272,000	220,000	250,000
Talc, soapstone, pyrophyllite		10,800	5,220	5,320	5,275	4,000
Titania e/ 10/		84,200 r/	108,000 r/	85,400	85,000	85,000
MINERAL FUELS AND RELATED MATERIALS						
Coal:						
Anthracite	thousand tons	1,860	2,040 r/	1,404	1,000	1,000
Bituminous including slurries, fines	do.	92,300 r/	83,300	66,800	47,971	51,583
Lignite	do.	3	3	2	2	2
Total	do.	94,163 r/	85,343 r/	68,206	48,973	52,585
Coke:						
Metallurgical		7,010	6,397 r/	6,030	6,164	5,280
Breeze, all types		152	131 r/	61	38	40
Fuel briquets, all grades e/		1,200	1,000	1,000	1,034	841 2/
Gas, natural:						
Marketable 11/	million cubic meters	69,300	64,100	65,500	69,700	76,000
Marketed 12/	do.	55,300	50,200	52,800	57,200	62,300
Natural gas liquids 13/	thousand 42-gallon barrels	51,400	35,300	40,700	53,200	
Petroleum:						
Crude 14/	do.	684,000	707,000	749,000	892,740	913,500
Refinery products:						
Liquefied petroleum gases	do.	19,300	18,500 r/	18,400	20,138	22,600 2/

See footnotes at end of table.

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TABLE 1–Continued
UNITED KINGDOM: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity		1991	1992	1993	1994	1995 e/
MINERAL FUELS AND RELATED MATERIALS–Continued						
Refinery products–Continued:						
Naphtha including white spirit	thousand 42-gallons barrels	21,400	26,100 r/	23,100	23,900	24,000
Gasoline	do.	236,000	249,000 r/	253,000	234,277	231,660 2/
Jet fuel	do.	56,300	61,500	66,700	61,600	62,696 2/
Kerosene	do.	19,000	19,000	20,000	22,994	22,661 2/
Distillate fuel oil	do.	194,000	191,000 r/	204,000	202,442	202,681 2/
Residual fuel oil	do.	87,900	82,500	83,000	75,777	72,395 2/
Lubricants	do.	6,810	8,140	8,200	9,072	8,827 2/
Bitumen	do.	14,000	14,200	15,000	15,568	14,902 2/
Petroleum coke e/	do.	3,100	2,940	3,000	3,735	3,000
Petroleum wax e/	do.	291	488	500	503	500
Unspecified e/	do.	4,340	3,300	3,500	4,361	30,177
Refinery fuel and losses	do.	45,700	42,500	42,000	42,000	42,000
Total e/	do.	688,841	700,668 r/	722,000	696,229	715,499

e/ Estimated. r/ Revised.
1/Table Includes data available through May 1996.
2/ Reported figure.
3/ Includes a small quantity of primary lead from domestic concentrate.
4/ Produced entirely from imported bullion and includes the lead content of alloys.
5/ Refined nickel and nickel content of ferronickel.
6/ Includes witherite.
7/ Salable product.
8/ Sales, dry weight.
9/ Proportions of grades not available; probably about two-thirds acid grade.
10/ Sales.
11/ Methane, excluding gas flared or reinjected.
12/ Marketable methane, excluding that used for drilling, production, and pumping operations.
13/ Includes ethane, propane, butane, and condensates.
14/ Excludes gases and condensates.

TABLE 2
UNITED KINGDOM: 1994 BALANCE OF PAYMENTS, SELECTED MINERAL COMMODITIES 1/

(Thousand dollars)

Mineral commodity	Exports to EU	Imports from EU	Net gain or (loss)	Exports to the world	Imports from the world	Net gain or (loss)
Crude industrial minerals:						
Feldspar	39	148	(109)	203	148	55
Magnesite	12	3,476	(3,464)	202	5,233	(5,031)
Slate	17	625	(608)	398	2,524	(2,126)
Other	353,477	218,171	135,306	648,885	536,954	111,931
Total	353,545	222,420	131,125	649,688	544,859	104,829
Metalliferous ores:						
Copper	100	150	(50)	391	249	142
Lead	–	253	(253)	47	253	(206)
Tin	255	6	249	7,784	6	7,778
Zinc	–	1,786	(1,786)	52	58,514	(58,462)
Other (including waste and scrap)	557,682	306,998	250,684	988,283	1,701,378	(713,095)
Total	558,037	309,193	248,844	996,557	1,760,400	(763,843)
Nonmetallic mineral manufactures	2,398,641	842,079	1,556,562	4,372,406	4,218,259	154,147
Metals:						
Iron and steel	2,814,286	2,930,500	(116,214)	5,429,897	4,369,850	1,060,047
Mercury	208	20	188	611	66	545
Other nonferrous metals	1,878,665	1,583,333	295,332	3,363,217	4,504,083	(1,140,866)
Total	4,693,159	4,513,853	179,306	8,793,725	8,873,999	(80,274)
Mineral fuels	7,672,269	1,890,560	5,781,709	13,392,560	8,987,919	4,404,641

1/ Table prepared by Harold Willis, International Data Unit.

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TABLE 3
UNITED KINGDOM: STRUCTURE OF THE MINERAL INDUSTRY FOR 1995
(Thousand metric tons unless otherwise specified)

Commodity	Major operating companies and major equity owners	Location of main facilities	Annual capacity
Aggregate	ARC Ltd. (Hanson PLC, 100%) Foster Yoeman Ltd.	50 quarries in various locations	50,000
		Glensanda quarry at Oban	15,000
Aluminum, primary	British Alcan Aluminium Ltd.	Fort William, Kinlochleven, and Lynemouth	175
Do.	Anglesy Aluminium Ltd. (RTZ Corp. Ltd. 51%; Kaiser Aluminum and Chemical Corp., 49%)	Holyhead, Wales	113
Aluminum, secondary	Trent Alloys Ltd. (Cookson Group, 100%)	North Cave, Humberside	30
Do.	Deeside Aluminium Ltd.	Clwyd, Wales	45
Ball clay	Watts, Blake, Bearne and Co. PLC	Various operations in north and south Devon	500
Celestite	Bristol Minerals Co. Ltd.	Yate, Avon	30
Cement	Aberthaw and Bristol Channel Portland Cement Co. Ltd	East Aberthaw, Glamorgan and Rhoose, Glamorgan	1,000
Do.	Blue Circle Industries PLC	Main plants at Couldon, Dunbar, Hope, Northfleet, Weardale, and Westbury	11,000
Do.	Castle Cement Ltd. (Aker Norcem AS, 50%; Indus AB Euroc, 50%;	Main plants at Ketton, Ribblesdale, Pades, and Pitstone	4,000
China clay (kaolin)	ECC Group PLC	Mines and plants in Devon	3,000
Coal	RJB Mining PLC	19 mines in various locations	40 1/
Copper	IMI Refiners Ltd.	Refinery at Walsall, West Midlands	80
Ferroalloys	British Steel PLC	Teesside, Cleveland	80
Do.	Murex Ltd.	Rainham, Essex	25
Do.	London and Scandinavian Metallurgical Co. Ltd.	Rotherham, South Yorkshire	30
Fluorspar	Weadale Fluorspar Ltd.	Mines in Derbyshire	50
Do.	Laporte Industries	Mill at Stoney Middleton, Mines in Derbyshire	70
Do.	British Gg sum Ltd.	Mines in Midlands, Cumbria and Sussex	3,500
Lead, refined	Britania Refined Metals Ltd.	Northfleet, Kent	165
Lead, secondary	H.J. Enthoven and Son Ltd. (Billiton (U.K.) Ltd., 100%)	Darley Dale, Derbyshire	60
Lead, smelter	MIM Holdings (U.K) Ltd.	Avonmouth, Avon	55
Natural gas	Amoco Ltd. British Petroleum Ltd. Esso (U.K.) Ltd., Phillips Petroleum Co. PLC, Shell (U.K.) Ltd.	North Sea gas fields	1,250 2/
Nickel, refined	INCO Europe Ltd. (INCO Ltd., Canada)	Clydach, Wales	30
Petroleum, crude	Amoco Ltd., British Petroleum Ltd., Chevron Ltd., Esso (U.K.) Ltd., Occidental Petroleum Co. Ltd., Shell (U.K.) Ltd., Texaco Ltd., Unocal, Inc.	North Sea oilfields	2.1
Petroleum, refined	British Petroleum Ltd., Conoco Ltd., Mobil Oil Co. Ltd., and others	11 refineries in various locations	2.3 3/
Platinum-group metals	Johnson Matthey PLC	Enfield (London) and Royston, Cambridgeshire	20
Potash	Cleveland Potash Ltd.	Boulby Mine, Yorkshire	500
Salt, rock	Imperial Chemical Industries PLC	Mines at Winsford, Chesire	3,000
Do.	Irish Salt Mining and Exploration Co.	Carrick Fergus, Northern Ireland	300
Sand and gravel	TMC Pioneer Aggregates Ltd.	Chelmsford, Essex	1,000,000
Silica, sand	Hepworth Minerals and Chemicals Ltd.	Operations in Cambridgeshire, Cheshire, Humberside and Norfolk	6,000
Steel	British Steel PLC	4 intergrated steelworks in Gwent, Lanark, South Humberside and Cleveland	16,800
Talc	Alex Sandison and Son Ltd.	Unst, Shetland Islands	15
Do.	Shetland Talc Ltd. (Anglo European Minerals Ltd., 50%; Dalriada Mineral Ventures Ltd. 50%	Cunningsburg, Shetland Islands	35
Tin, ore	Carnon Consolidated Tin Mines Ltd.	South Crofty Mine, Cornwall	1,800
Titanium, sponge	Deeside Titanium Ltd.	Plant at Deeside, Clyde	5
Zinc, smelter	MIM Holdings (U.K.) Ltd.	Avonmouth, Avon	120

1/ Million metric tons.
2/ Billion cubic feet per year.
3/ Million 42-gallon barrels per day.

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THE MINERAL INDUSTRY OF

UZBEKISTAN

By Richard M. Levine

Uzbekistan was the third most populous state created from the FSU and the fourth largest in land area. Well endowed with mineral wealth, it was among the world's largest producers of gold, which was a significant source of foreign currency earnings. Besides gold, Uzbekistan was a significant producer of nonferrous metals and natural gas. The nonferrous metals industry included the mining of bismuth, cadmium, copper, lead, molybdenum, palladium, silver, tin, tungsten, and zinc, and the production of bismuth, cadmium, copper, gold, indium, molybdenum, rhenium, tungsten, silver, and zinc metals. Uzbekistan also produced steel and mineral fuels, including coal, gas, oil, and uranium, and had one of the FSU's largest gas-processing facilities at Mubarek. Uzbekistan also produced significant quantities of industrial minerals, including feldspar and fluorspar, as well as a range of minerals for the construction industry.

In 1995, GDP in Uzbekistan was estimated to have fallen by 2% compared with 1994 which was comparable to the previous 2 years when GDP fell by under 5%. In 1995, mining enterprises were still Government controlled. The Government was considering a program for denationalization of mining enterprises in 1996 and 1997.

The Almalyk mining and metallurgical complex, which mines copper-molybdenum ores and lead-zinc ores, has a copper smelter and refinery and a zinc refinery, and produces refined copper, metallic zinc, lead and molybdenum concentrates, sulfuric acid, metallic bismuth, cadmium, gold, indium, silver, and other metals and sulfuric acid. Almalyk consisted of five mining enterprises, two beneficiation plants, and two metallurgical plants.

At Almalyk, lead-zinc ores are mined from three underground mines, the large Altyn Topkan Mine with a capacity of over 1.5 Mt/yr, the Uch Kulach Mine with a capacity of about 1 Mt/yr, and the Uch Pay Mine with a capacity of about 100,000 t/yr. At existing mines, the lead-zinc ores reportedly grade between 1% to 2% for both lead and zinc. Copper-molybdenum ores were mined from two open pits, the Kalmakyr and Sary-Cheku. At existing mines, the copper ores reportedly grade between 0.4% and 0.5% copper and the molybdenum ores between 0.004% and 0.005% molybdenum. Uzbekistan was interested in both developing new higher grade deposits and acquiring processing technologies to extract minerals from lower grade ores.

Production at Uch Kulach which is over 300 km from the Almalyk concentrator had fallen sharply because of high transport costs. Mine output of both lead and zinc in Uzbekistan in 1995 had decreased by about two-thirds compared with 1990. Almalyk's production of lead concentrates had fallen from over 35,000 t/yr of lead in concentrate in 1990 to an estimated 10,000 t/yr of lead in concentrate in 1995. The Almalyk complex at the beginning of 1995 stopped sending its lead concentrates to the Chimkent plant in Kazakstan for processing. It does not appear that Almalyk's lead concentrate production in 1995 was shipped for processing and could be stockpiled at Almalyk. Slab zinc production at Almalyk in 1995 was maintained at the 1994 level of about 70,000 t as about 50% of this output was from toll smelted material from China, Iran, Mexico, and Poland.

Copper production in 1995 at Almalyk at both open pits had fallen sharply compared with 1990; production at Kalmakyr which produced over 20 Mt of ore in 1990 and Sary-Cheku which produced about 3 Mt/yr of ore in 1990 had fallen by more than one-third, in large measure because of a lack of needed investment funds. Blister copper and copper cathode production in 1995 rose despite the fall in domestic mine output as Almalyk began toll smelting and refining foreign material, mainly from Latin America.

Almalyk was in need of investment funds to increase copper ore production and to modernize its metallurgical facilities. In particular, Almalyk needed to upgrade its wire rod production facility and to replace one of its two furnaces, a reverberatory furnace, with an oxygen enriched furnace. The other furnace was a Russian made oxygen enriched furnace.

Uzbekistan reportedly was the world's eighth largest gold producer with output in 1995 estimated at about 80 t. The Zarafshan-Newmont joint venture reported shipping its first gold to London in 1995. The Uzbek partners of the United States Newmont Corp. are the Navoi mining and metallurgical complex and the Uzbekistan State Committee for Geology and Mineral Resources. The joint venture processes ore piles from the open pit with heap leaching. The joint venture reportedly would have a 17-year life-span, during which 156 t of gold would be extracted; annual output reportedly was to begin at 14 t/yr and decrease to 7 t/yr.

In 1995, the United Kingdom's Lonrho Plc reached an

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agreement with Uzbekistan officials to develop the Amantaytau goldfields near Zarafashan containing difficult to process gold-arsenic ores. The fields reportedly grade slightly more than 3 grams per metric ton (g/t) of gold. A recently completed Lonrho study put reserves at 60 Mmt of ore. Plans call for mining the deposit at the rate of 3.5 Mt/yr of ore for a 17-year period with gold output beginning at 300,000 ounces per year and reaching 450,000 ounces per year in the fifth year. The life of the project could be extended beyond the planned 17 years if further exploration yields additional reserves.

In 1995, Uzbekistan reportedly produced 5 Mt of oil and 47 billion m^3 of natural gas. Priority projects in the petroleum sector included constructing an oil refinery in Bukhara and investing to increase oil production at the Kokdumalak oil and gas condensate field from 2 Mt/yr to eventually 6.5 Mt/yr. Uzbekistan was gaining oil independence from Russia as it had reduced its imports of Russian oil from over 4 Mt/yr to 350,000 t in 1995 with projections for no imports in 1996.

Uzbekistan planned to significantly increase coal output to 10 Mt/yr to 12 Mt/yr by developing new capacity to mine an additional 5 Mt/yr and by upgrading existing open pits. Uzbekistan reportedly has exploitable coal resources totaling 3 billion t, of which 1 billion t are anthracite. The Angren coal mining complex that produces the majority of the country's coal reportedly has 1.9 billion t of proven reserves.

In 1995, Uzbekistan began to build the Uzbeksoda enterprise to produce 570,000 t/yr of soda ash near the Barsa Kelmes salt mine in the north of the country. Plans called for the enterprise to produce 20 types of sodas and to have a glass plant to supply the Asak automobile plant in eastern Uzbekistan. Reportedly Uzbekistan was seeking foreign investors to participate in this project.

Uranium production in Uzbekistan has increased by about 50% since the breakup of the Soviet Union, increasing from about 2,000 t of uranium (U) in 1991 to over an estimated 3,000 t U in 1995. Mining is conducted at the Navoi mining and metallurgical complex which is colocated with the major gold producing enterprise of the country.

According to the Uzbekistan State Committee for Geology and Mineral Resources, Uzbekistan has adequate reserves to increase production of a large number of minerals including copper, feldspar, fluorspar, gold, lead, lithium, phosphate rock, potash, tin, tungsten, silver, and zinc. The country is interested in soliciting foreign investment to develop its mineral resources and is particularly interested in developing those needed by the economy such as potash, soda ash, and phosphate fertilizers. Besides these minerals, Uzbekistan is preparing to solicit investment for development of copper-molybdenum, gold-silver, lead-zinc, lithium, silver, strontium, titanium, tungsten, and vanadium reserves. The country also has a number of copper deposits at existing enterprises where the remaining ore is too low grade for conventional mining, but reportedly would be suitable for heap leaching with recovery of byproduct gold, molybdenum, and silver. Furthermore, the country has wastes at gold-processing plants with a gold content reportedly of 0.5 to 0.9 g/t that it seeks to process. Uzbekistan appears to be positioned to gain considerable revenue from increased gold production, but like the other countries of the FSU, is still awaiting major investment in its other nonfuel mineral industries.

OTHER SOURCES OF INFORMATION

Ministry of Foreign Economic Relations
75, Buyuk Turon Yoli St.
700077, Tashkent, Uzbekistan
Telephone: 011-7-3712-34-44-80, Fax: 011-7-3712-39-84-63

The State Committee of Geology and Mineral Resources
11 Ulitsa Shevchenko
700000 Tashkent, Uzbekistan
Telephone: 011-7-3712-33-18-01/33-72-06, Fax: 011-7-3712-56-02-83

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TABLE 1
UZBEKISTAN: STRUCTURE OF THE MINERAL INDUSTRY FOR 1995

(Metric tons unless otherwise specified)

Commodity	Major operating facilities	Location	Annual capacity e/
Bismuth	Ustarasayskoye deposit	Chatkalo-Kuraminskiy region	20.
Coal	Central Asian Coal Association (mining)		
	Angren brown coal deposit	Angren region	6,000,000.
	Baysunskoye deposit	Surkhondaryo region	1,000,000.
Copper:			
Mine output, Cu content	Almalyk mining-metallurgical complex	Kalmakyrskoye, Sarychekinskoye deposits	100,000.
Metal	Almalyk refinery	Olmaliq (Almalyk) 1/	130,000.
Feldspar	Karichasayskoye and other deposits	Deposits in Samarqand (Samarkand) and Toshkent (Tashkent) regions and Karakalpakstan (Karakalpakskaya ASSR)	120,000.
Fluorspar	Agata-Chibargatinskoye, Naugiskenskoye deposits	East of Toshkent (Tashkent)	150,000.
Gold	Muruntau deposit	Nawoiy (Navoi) region	85.
Kaolin	Central Asian coal association	Angren deposit	8,000,000.
Lead-zinc			
Mine output, metal content	Almalyk mining and metallurgical complex	Uchkulachskoye deposit	40,000 (lead).
Do.	do.	do.	80,000 (zinc).
Zinc, metal	Almalyk refinery	Olmaliq (Almalyk)	120,000.
Molybdenum	Almalyk mining and metallurgical complex, Koytash tungsten-molybdenum mine	Kalmakyrskoye, Koytashskoye, Sarychekinskoye deposits	900.
Natural gas liquids	Mubarek gas processing plant	Mubarek	1,200,000.
Petroleum and natural gas	More than 40 oil and gas deposits and more than 15 gas deposits under exploitation	Oil deposits in Farghona and Surkhondaryo regions, major gas deposits: Dzharkakskoye, Gazlinskoye, Mubarekskoye, and Shurtanskoye	50 billion cubic meters (natural gas).
Do.	do.	Oil deposits: Khaudagskoye, Uchkyzylskoye, Kokaytinskoye in Surkhondaryo region; Palvantashskoye, Yashiy Alamyshikskoye, Sharikhan-Khodzhiabadskoye in Farghona region	5,000,000. (petroleum).
Steel, crude	Bekabad steel mill	Bekabad	1,100,000.
Tin	Karnabskoye, Lapasskoye deposits	Karnab region	NA.
Tungsten, mine output, W content	Koytashskoye, Ingichkinskoye Lyangarskoye, Karatyubinskoye Yakhtonskoye deposits	Ingichka, Koytash, Lyangar regions	1,200.
Tungsten, metal	Chirchik metals plant	Chirchiq (Chirchik)	NA.
Sulfur	Mubarek gas processing plant complex	Mubarek	2,000,000.
Uranium	Navoi mining complex	Nawoiy (Navoi) region	NA.

e/ Estimated. NA Not available.
1/ New names and spellings for locations will be used whenever available; old names will appear in parentheses.

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